Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

FILE COPY
To be returned to files

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY

Reserve

BOOK NUMBER A464.07
967053 P693B
1927

FILE COPY
To be returned to file

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

STER-RUST CONTROL

618 Realty Bldg.,
Spokane, Wash.,
April 26, 1928.

RECEIVED
APR 30 1928

Mr. G. B. Posey,
Blister Rust Control,
Bureau of Plant Industry,
Washington, D. C.

Dear Posey:

I am sending you, under separate cover by registered mail, two copies of the annual report for 1927 on the work of the Western Office of Blister Rust Control, and the following maps which are to accompany these reports: Pre-eradication Results, Couer d'Alene National Forest; 1927 Experimental Ribes Eradication Area, Coeur d'Alene National Forest; 1926-1927 Experimental Ribes eradication, Stanislaus National Forest; 1928 Pre-eradication Area Stanislaus National Forest.

Filed in Map case #8- Far Rack

Sincerely yours,

Stephen N. Wyckoff

Stephen N. Wyckoff,
Pathologist.

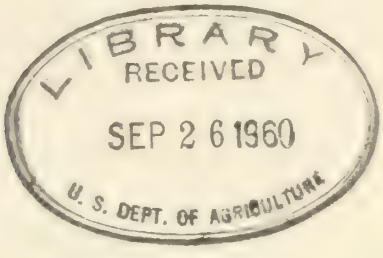
k/k
Sep.Encl.2.Reg.



B L I S T E R R U S T W O R K

I N T H E F A R W E S T

January 1 to December 31, 1927.



Spokane Branch
Office of Blister Rust Control
618 Realty Building
Spokane, Washington

CONTENTS

	Page
Introduction	1-8
Allotment of funds	4
Permanent personnel	7
Blister Rust Control Work in Montana	9-34
Memorandum of Understanding	9
Control reconnaissance	12
Pre-eradication of Savenac Nursery	32
Scouting for the disease	33
Blister Rust Control Work in Idaho	35-318
Memorandum of Understanding	35
Cultivated black currant eradication	39
Experimental chemical eradication	41-124
Research work	41-61
Investigation of toxic action of halogens and oxy-halogens	44-61
Field experiments	62-103
Rechecking of previous work	63-72
Wallace, Idaho	63-65
Santa, Idaho	65-68
Clarkia, Idaho	69-72
New experiments	72-97
Strawberry, California	72
Santa, Idaho	72-92
Bovill, Idaho	92-96
Power equipment tests	96-97
Cost data	98-99
Summary of field tests	100-103
Crew management in chemical eradication	104-116
Knapsack equipment	104-111
Power equipment	111-115
Comparison of two methods	115-116
Future working plans	116-118
Summarized data on power equipment	118-124
Ribes Ecology	125-217
Introduction, purpose, forms	125-127
List of studies and summary of results	128-131
Controlled plot studies	131-151
Results of duff disturbance	152-188
Restocking of Ribes after eradication	189-194
Root competition study	195-199
Life habits of Ribes	200-209
Ribes seed germination tests	210-211
Leaf-area live-stem studies	212-217
Experimental Ribes eradication	219-363
Introduction and purpose	219-220
Location and description of area	220-221

CONTENTS

Introduction
Acknowledgments
Personnel

Water Pollution Control Work in Montana
Responsibility
Control regulations
Pre-application of treated effluent
Training for the disease

Water Pollution Control Work in Idaho
Responsibility
Control regulations
Pre-application of treated effluent
Personnel
Laboratory
Field equipment
Records of previous work
Boise, Idaho
Nampa, Idaho
Caldwell, Idaho
Weiser, Idaho
Payette, Idaho
Ontario, Oregon
Vale, Oregon
Burley, Idaho
Rupert, Idaho
Twin Falls, Idaho
Gooding, Idaho
Shoshone, Idaho
Hailey, Idaho
Ketchum, Idaho
Salmon, Idaho
Lewiston, Idaho
Pocatello, Idaho
Blackfoot, Idaho
Idaho Falls, Idaho
Rexburg, Idaho
Preston, Idaho
Soda Springs, Idaho
Montpelier, Idaho
Afton, Wyoming
Star Valley, Wyoming
Kemmerer, Wyoming
Evanston, Wyoming
Green River, Wyoming
Rock Springs, Wyoming
Laramie, Wyoming
Cheyenne, Wyoming
Torrington, Wyoming
Scottsbluff, Nebraska
Sidney, Nebraska
Alliance, Nebraska
Chadron, Nebraska
Rapid City, South Dakota
Lead, South Dakota
Deadwood, South Dakota
Spearfish, South Dakota
Sturgis, South Dakota
Belle Fourche, South Dakota
Newell, South Dakota
Hot Springs, South Dakota
Edgemont, South Dakota
Custer, South Dakota
Hill City, South Dakota
Keystone, South Dakota
Summary of field tests
Laboratory examinations
Bacteriological examinations
Chemical examinations
Biological examinations
Sanitary survey
Location and description of area
Industries
Population
Water supply
Sewerage system
Sewage treatment plants
Operation
Laboratory control
Effluent
Stream
Sludge disposal
Sludge digestion
Sludge drying beds
Sludge disposal
Sewage flow
Sewage characteristics
Sewage pumping stations

CONTENTS (cont'd)

	Page
Methods and equipment	221-224
Work performed and results	224-243
Crew organization	233-237
Pre-eradication	237-238
Methods experiments	238-243
Statement and analysis of cost	243-247
Recommendations for future work	247-248
Summary of experimental eradication, 1922-1927	249
Supplemental report on pre-eradication	250-252
Supplemental report on relation of time of eradication to logging	253-255
Supplemental report on checking	256-263
Control reconnaissance	264-318
Definition and purpose	264
Methods of work	264-271
Results of work on National Forest lands	271-286
Kaniksu National Forest	272-276
Pend Oreille National Forest	276-280
St. Joe National Forest	281-284
Cost of work	285-286
Results of cooperative work on private lands	287-309
Clearwater Timber Protective Association	287-290
Coeur d'Alene Timber Protective Association	291-294
Pend Oreille Timber Protective Association	295-298
Potlatch Timber Protective Association	299-302
Priest Lake Timber Protective Association	303-307
Cost of work	307-309
Summary	310-318
Scouting for the disease	403
Blister Rust Control Work in Washington	319-428
Memorandum of Understanding	319-320
Cultivated black currant eradication	321-325
Control reconnaissance	326-330
Definition and purpose	326
Methods of work	326
Results of work	326-329
Cost of work	329-330
Study of infection conditions in western Washington	331-402
Purpose of work, methods	331-337
Spring scouting for pine infection	337-338
General survey	338-390
Chelan County	340-341
Clallam County	342-349
Clarke County	349-350
Cowlitz County	350-351
Grays Harbor County	351-352
Island County	352-353
Jefferson County	353-355
King County	355-356

CONTENTS

CONTENTS (cont'd)

	Page
Kitsap County	356-360
Kittitas County	361
Lewis County	361-363
Mason County	363-366
Pierce County	366-368
Skagit County	368-370
Skamania County	370-375
Snohomish County	375-379
Thurston County	379-380
Whatcom County	380-388
Forest Service white pine plantations	388-390
Cost of work	390-392
Summary and conclusions	392-402
Inspection of Forest Nurseries	402-404
Scouting for the disease, eastern Washington	403-428
Results of work	405-425
Cost of work	425
Summary	425-428
Blister Rust Control Work in Oregon	429-497
Memorandum of Understanding	429-430
Educational work	431
Nursery and quarantine inspection	432-433
Ecology and experimental eradication	433-490
Introduction and plan of work	433-436
Still Creek area	436-457
Prospect area	457-484
General survey	485-490
Scouting for the disease	491-492
Recommendations for future work	495-497
Blister Rust Control Work in California	498-573
Memorandum of Understanding	498-500
Cultivated black currant eradication	502-506
Quarantine and nursery inspection	506-507
Educational work	507-508
Scouting for the disease	508
Control reconnaissance	510-530
Purpose and methods of work	510-516
Results of work	516-525
Cost and time analysis	526-530
Experimental Ribes eradication	531-573
Introduction and purpose	531-532
Location of area	532-533
Organization and methods of work	533-541
Results of work	541-547
Cost of work	548-555

Kings County
Kittitas County
Klamath County
Lewis County
Mason County
Pierce County
Shasta County
Siskiyou County
Snohomish County
Thurston County
Whatcom County
Wheeler County
Forest fertile white pine plantations
Cost of work
Summary and conclusions
Inspection of forest properties
Operating for the disease, western hemlock
Results of work
Cost of work
Summary

Winter host control work in Oregon
Reporting of Cronartium
Educational work
Survey and preventive inspection
Safety and economical eradication
Introduction and plan of work
Fill free area
Property area
General survey
Scouting for the disease
Recommendations for future work

Winter host control work in California
Reporting of Cronartium
Individual block control practices
Conditions and survey inspection
Educational work
Scouting for the disease
General recommendations
Purpose and methods of work
Results of work
Cost and time analysis
Experimental fields established
Introduction and history
Location of area
Organization and control of work
Supply of work
Cost of work

CONTENTS (cont'd)

	Page
Checking	556-560
Root and crown studies	560-561
Ribes studies	561-562
Cooperative plots	562-564
Pre-eradication	564-567
Experimental chemical eradication	41,72
General survey of sugar pine and Ribes conditions	568-573
Quarantine Inspection	574-590
Inspection of plant shipments	575-579
Automobile inspection	580-581
Christmas tree shipments	581-587
Recommendations	587-590
Pine Damage Studies, Cheekye, British Columbia	591-610
Educational Work	611-617
Scouting for the Disease, British Columbia	403
Financial Report	618-619
General Summary	620-623

Page

Chemistry
Beet and cane studies
Fibre plants
Tobacco, tea, and cocoa
Fermentations
Agricultural chemical preparations
General survey of sugar-cane soil types and conditions

Quarantine inspection
Inspection of plant shipments
Entomologic inspection
Chrysomphalus tribus eradicated
Determinations

Fine Energy Shrike, Cowpea, Dotted Chalcis

Educational Work

Housing for the Disease, Brilliant Diamond

Financial Report

General Summary

BLISTER RUST WORK
IN THE FAR WEST

January 1 to December 31, 1927.

* * *

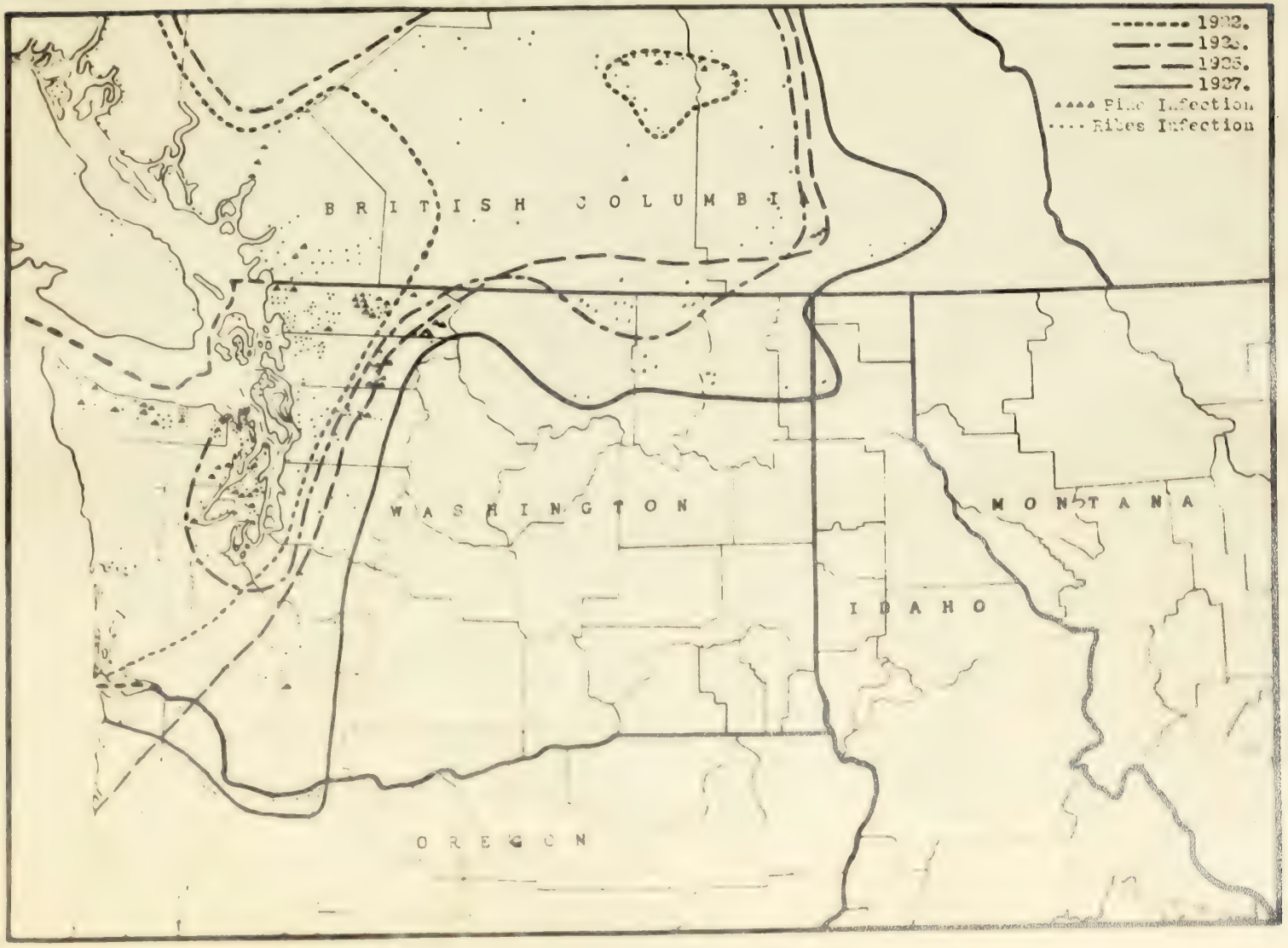
INTRODUCTION

The following report is designed to summarize the activities of the Western Branch of the Office of Blister Rust Control, Bureau of Plant Industry, for the calendar year 1927.

The most important development of 1927 has been the spread of the rust into north Idaho and northwestern Oregon. A moist spring and summer, occurring at a time when the centers of pine infection in western Washington and eastern British Columbia were sufficiently developed to provide the requisite number of aecia, resulted in one of the more or less periodic southward thrusts of the disease. The result of this southward spread is that at least two counties in the northern end of Idaho and five counties in northwestern Oregon must be regarded as potentially infected with blister rust. The following map will show the rate of spread of the rust during the period of 1922 to 1927;



SPREAD OF WHITE PINE BLISTER RUST IN THE WEST



As this spread of the disease was not known until near the end of the 1927 field season, it did not cause any alteration in the plan of work for the year, which proceeded on the basis of the original plans. The most important results of the season's work may be summarized as follows:

1. Cultivated black currant eradication: completion of program with the exception of California, where at least two more seasons of work are necessary.

2. Control reconnaissance: a point has been reached where the end of this work in Idaho and Montana can be definitely seen. One more full season of work will put this project on a basis whereby it could be discontinued if thought advisable. In California, reconnaissance methods are well developed, and the work well under way.

3. Experimental Ribes eradication: the unit used in north Idaho in 1927 probably represents the maximum size which will ever be necessary in a single locality. The organization side of such an operation is now fairly well developed, and the number of units possible to put into the field is only limited by the available supervisory personnel.

4. Experimental chemical eradication: sprays are now available of known efficiency in killing Ribes petiolare. Crew organization with knapsack sprayers is fairly well developed, and the initial stage of experimentation in power equipment is under way. Investigative work on chemicals to kill Grossularia inermis and R. lacustre is now thoroly organized;

5. Methods studies: the ground work of experimenting on Ribes eradication organization is now well out of the way. This will permit more intensive experimentation on actual methods.

6. Studies in Ribes ecology: this work has now passed thru a necessary preliminary stage, and has now reached a period of development wherein the problems to be solved can be definitely stated and worked upon. Sufficient information has been secured to serve as at least a preliminary basis for methods studies in eradication.

7. Pine infection studies: the rust has now reached a stage of development in Washington which will permit close study of local areas to determine the effect, in terms of pine damage, of known amounts of Ribes leafage. The information will be of direct application to local control operations.

The activities of the Western Branch of the Office of Blister Rust Control were, for the period January 1, 1927 to June 30, 1927, conducted from the funds of $160,000 allotted to western work for the fiscal year 1927. For the period July 1, 1927 to December 31, 1927, this work was carried on from the funds of $260,000 allotted to western work for the fiscal year 1928. The funds indicated were officially allotted to the various phases of the western control program as follows:

Allotment of Funds, Fiscal Year 1927.

Project	Period July 1, 1926 to June 30, 1927.
A. Study and Application Delay Measures	
1. Continuance toward eventual completion of eradication of cultivated black currants in the states of Montana, Idaho, Washington, Oregon and California. (Preliminary control measures.)	$15,000
2. Continuance of necessary quarantine inspection to prevent further dissemination of the rust through shipment of infected host plants	9,500
3. Field inspections and surveys in Oregon to determine the spread of the disease from year to year and to apply practical measures of checking it.	10,000
B. Study of Disease to Determine Important facts Influencing its Control	
1. Pathological investigation	12,000
C. Experimental Development and Application of Local Control Measures	
1. Control reconnaissance to determine the potential blister rust danger in various localities and forest stand types and to estimate cost of control	
(a) In western white pine region	10,000
(b) In sugar pine region	5,000

The activities of the Western Branch of the Bureau of Plant Pest Control were, for the period January 1, 1937 to June 30, 1937, conducted from the funds of $146,000 allotted to western work for the fiscal year 1937. For the period July 1, 1937 to December 31, 1937, this work was carried on from the funds of $130,000 allotted to western work for the fiscal year 1938. The funds incurred were efficiently allotted to the various phases of the work as carried projects as follows:

Allotment of Funds, Fiscal Year 1937.

Project	Period July 1, 1936 to June 30, 1937.
1. Study and Application Data Research	
2. Continuance toward eventual completion of eradication of Citrated Fruit fly in Florida, Texas, Pendleton, Oregon and California. (Preliminary control measures.)	$ 12,000
3. Continuance of research projects Investigation to prevent further disseminations of the pest through shipment of infested host fruits	7,000
4. Field inspections and surveys to ensure to keep to Determine the spread of the disease from Plan to put and to apply practical measures of checking it.	17,000
5. Study of Diseases to Maintain Important Fruit Influencing the Crops.	
6. Experimental Investigations	12,000
7. Experimental Developments and Explorations of Insect Control Measures	
8. Control research to determine the practical relief from damage in various Investigation may insect spread types and to methods (any) of control	
(a) In western Gulf region	10,000
(b) In south Pine region	8,000

Project (Cont'd.)	Period July 1, 1926 to June 30, 1927 (Cont'd)
2. Large scale demonstration in the application of local control on the national forests in the western white pine belt	$44,500
3. Cooperative demonstration of local control on State and private western white pine lands	10,000
4. Small scale demonstrations in the application of local control on the national forests in the sugar pine belt	10,000
5. Development of improved control methods, reduction of eradication costs, and working out methods for assuring efficiency of eradication on control areas, including a study of Ribes regrowth on 1922 and 1923 control areas	
(a) In western white pine areas	10,000
(b) Sugar pine areas	4,000
6. Experiments to determine the toxicity of chemicals and to develop effective means of applying them in Ribes eradication	5,000
7. Study of Ribes ecology to determine factors influencing occurrence and regrowth of these plants in western white and sugar pine forests	5,000
D. Educational activities to inform the public concerning blister rust and to secure its cooperation in applying measures for the control of this disease	10,000
Total.	$160,000

Allotment of Funds, Fiscal Year 1928.

Project	Period July 1, 1927, to June 30, 1928.
A. Delaying spread of blister rust	
1. Eradication of cultivated black currants in Idaho, Washington and California	$16,071.67
2. Quarantine inspection (West only)	9,350.00
3. Field surveys and inspection of nurseries in Oregon	4,335.00
4. Field surveys in northwestern states to determine location of dangerous centers of pine infection and to follow the natural advance and establishment of blister rust in the northern area	14,473.33
B. Development and application of local control	
1. National forests of northeastern Washington, Idaho and northwestern Montana	53,215.00
2. Local control on state and private land dollar for dollar cooperation between Federal Government and timber owners	11,055.00
3. Control reconnaissance in Idaho, Montana and northeastern Washington	14,766.67
4. Studies of local control and its costs in California	13,310.00
5. Control reconnaissance and Ribes survey, California sugar pine areas	7,0[illegible].00
6. Studies of local control and recheck of 1925 eradication area, Oregon	6,095.00
C. Investigational work, Office of Forest Pathology	21,500.00
D. Experimental work on chemical eradication and studies on Ribes ecology	24,065.00
E. Educational work	6,313.33
F. Field supervision, maintenance of Spokane office, miscellaneous supplies	19,950.00
G. Mississippi Valley quarantine work, maintenance of Washington office, Departmental reserves	38,500.00
Total	$260,000.00

It will be noted that included in this allotment of funds are two items, "C" and "G" which, while directly effecting the western control program, are not expended by the Western Office of Blister Rust Control. Notwithstanding this fact, each is individually necessary to the progress and direction of the field work or administration general activities.

Item "G" is made up as follows:

2% Departmental Reserve	$ 5,200
1% Bureau Reserve	2,600
Maintaining of head office, western charge	10,000
Mississippi Valley Quarantine	20,700
Total	$38,500

The present organization of the Western Branch of the Office of Blister Rust Control is yet in a transitional stage between close centralization, in which the work is all organized under direct supervision of the Spokane Office. The majority of the project leaders are permanently headquartered at Spokane. The state leaders for Montana, Oregon and California are headquartered in those states as well as certain project leaders due to facilities and conditions which make it possible to carry on certain work the full year. Even though more and more work is organized locally in the various states, the general supervision to which the state leaders are responsible will remain with the Western Branch Office at Spokane, Washington.

The following is the permanent western personnel which was employed during the period covered by this report:

1. Supervisory: S. M. Wyckoff, Pathologist, In Charge of Western Branch Office.

2. Project Leaders:

(a) Quarantine Inspection - C. R. Stillinger, Associate Pathologist.

(b) Ribes Ecological Studies - W. A. Rockie, Assistant Pathologist.

(c) Control Reconnaissance on Federal and Private Lands, Idaho and Washington - J. L. Bedwell, Assistant Pathologist, assisted by M. C. Riley, Junior Forester; W. F. Painter, Agent; and H. F. Geil, H. L. Whiting, G. M. Whiting and R. E. Myers, Collaborators.

(d) Experimental Ribes Eradication, Idaho - C. C. Strong, Assistant Forester, assisted by F. A. Patty, Junior Pathologist; B. A. Anderson and P. S. Simcoe, Junior Foresters and A. H. Glasgow, D. R. Payne, H. E. Swanson, and C. O. Peterson, Agents.

(e) Educational Work - C. R. Stillinger, Associate Pathologist.

(f) Studies on Spread of the Rust and Damage to Pine- H. N. Putnam, Associate Pathologist, assisted by E. L. Joy, Junior Forester and R. L. MacLeod, Agent.

(g) Experimental Chemical Eradication - M. R. Offord and P. B. Bell, Agents.

(h) Cultivated Black Currant Eradication, Washington - G. A. Welch and B. A. Ganoung, Agents.

3. State Leaders:

Montana, C. H. Johnson, Assistant Pathologist.
Oregon, L. N. Goodding, Associate Pathologist.
California, G. A. Root, Assistant Pathologist, assisted by Project Leaders, W. V. Benedict, Junior Forester- (Eradication), E. C. Kenyon, Agent - (Reconnaissance.)

4. Clerical Work:

R. Calhoun, Principal Clerk and Temporary Special Disbursing Agent.

Miss M. L. McWold, Clerk.

Mrs. L. Klatt, Asst. Clerk-Stenographer.

Miss S. K. Millick, Under Clerk-Typist.

Miss A. M. Fellows, Under Clerk-Typist.

BLISTER RUST CONTROL WORK IN MONTANA
1927

The following is the memorandum of understanding under the terms of which the work in Montana is organized:

MEMORANDUM OF UNDERSTANDING
between
THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and the
MONTANA STATE DEPARTMENT OF AGRICULTURE - - - MONTANA STATE FORESTRY DEPARTMENT - - - SCHOOL OF FORESTRY, UNIVERSITY OF MONTANA - - - and NORTHERN MONTANA FORESTRY ASSOCIATION
relative to
Cooperative White Pine Blister Rust Control Work in Montana
Effective July 1, 1927.

--------oOo--------

A. The BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. The MONTANA DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease;

(3) Undertake such destruction of white pine or Ribes in Montana and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work; and

(4) Furnish the State Leader in charge of blister rust control work in Montana such office space as is necessary for properly conducting his work.

C. The MONTANA FORESTRY DEPARTMENT agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, scouting for white pine blister rust and taking such action as may be necessary to delay the spread of blister rust into white pine areas under its control and supervision.

D. The SCHOOL OF FORESTRY, UNIVERSITY OF MONTANA, agrees to:

(1) Assist the cooperating agencies so far as practicable in carrying out the activities enumerated in this memorandum.

E. The NORTHERN MONTANA FORESTRY ASSOCIATION agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating black currants, scouting for white pine blister rust and taking such action as may be necessary to delay the spread of blister rust into white pine areas under its control and supervision.

F. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated by either party by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Montana;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticised by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for host plants destroyed in control work;

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $6,000, the Montana State Department of agriculture approximately $5,000, the Montana State Forestry Department

6. The [illegible] agrees [illegible]:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, scouring for white pine blister rust and taking such action as may be necessary to delay the spread of blister rust into white pine areas under its control and supervision.

7. The [illegible] agrees [illegible]:

(1) Assist the cooperating agencies so far as practicable in carrying out the activities enumerated in this memorandum.

8. The [illegible] agrees [illegible]:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating black currants, scouring for white pine blister rust and taking such action as may be necessary to delay the spread of blister rust into white pine areas under its control and supervision.

9. It is [illegible]:

(1) This memorandum may be terminated by either party by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Montana;

(3) All cultural records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all finding of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating parties. All manuscripts therefor shall be criticized by the cooperating parties before publication; and all forms [illegible] agreed to be used in penalty enforcement, [illegible] shall be submitted for approval by the Bureau of Plant Industry before being printed or distributed;

(5) [illegible] by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for most plants destroyed in control work;

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $6,000, the Montana State Forestry Department agricultural approximately $8,000, the Montana State Forestry Department

approximately $1,200, the School of Forestry, University of Montana, approximately $300, and the Northern Montana Forestry Association shall contribute in value approximately $1,000; thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:	Signature:
7/29/27	(s.) A. H. Bowman Commissioner, Montana Department of Agriculture.
8/1/27	(s.) Rutledge Parker State Forester, Montana Forestry Department.
8/1/27	(s.) Thos. C. Spaulding Dean, School of Forestry, University of Montana.
8/24/27	(s.) A. E. Boorman Secretary, Northern Montana Forestry Association.
9/19/27	(s.) W. A. Taylor Chief, Bureau of Plant Industry.

approximately $1,000, the School of Forestry, University of Montana, approximately $250, and the Montana Logging Forestry Association shall contribute in value approximately $1,250; thereafter the amount to be contributed by each shall be determined and agreed upon by resolution of the corresponding.

Date: Signature:

7/20/37 (1.) A. E. Brown
Secretary, Boston Department of Agriculture.

8/1/37 (2.) Phillip Green
State Forester, Montana University Department.

8/1/37 (3.) Thos. C. Donville
Dean, School of Forestry, University of Montana.

8/22/37 (4.) A. K. Jones
Secretary, Northern Pacific Forestry Association.

9/12/37 (5.) A. A. Taylor
Chief, Bureau of Lost Industry.

CONTROL RECONNAISSANCE ON THE KOOTENAI AND CABINET NATIONAL FORESTS

By

C. H. Johnson
Assistant Pathologist

Control reconnaissance in 1927 was performed on the Kootenai and Cabinet national forests, both areas being very similar, the topography varying from gentle slope to steep precipitous crags which generally serve as a boundary between the two forests. The principal drainage on the Kootenai are: The Kootenai and Yaak Rivers, Libby, O'Brien and Callahan creeks and tributaries to these streams. The Clarks Fork, Bull and Thompson rivers and their tributaries are the chief drainages of the Cabinet Forest.

Economic Development

Lumbering, mining and farming are the leading industries in the region. Only small areas on the Cabinet are adaptable to farming. It is safe in stating that 90 per cent of the area of both forests is best suited for growing timber and whatever prosperity and means of livlihood comes to the inhabitants of the region will, in a large measure, be derived from the forests.

Accessibility

Much of the remaining mature timber on the Kootenai Forest is very inaccessible. However, modern methods of logging will most likely solve the transportation problem. The forest is well served by trails for protective purpose.

On the Cabinet Forest only small areas of mature white pine remain, but prospects are bright for the future as there exists large areas of white pine reproduction and pole size timber which represents the next timber crop. Most of the timber is accessible either by water or railroad transportation or highways and logging roads. In general logging chances are good. The chief problem on the Cabinet is one of protection until the younger stands reach maturity.

Forest Types and Age Classes

White pine does not occur in pure stands but is found associated with larch, Douglas fir, hemlock, cedar and lodgepole and generally confined to north and east slopes, benches and levels to gentle slopes. All age classes from 1 to 200 years plus occur on both forests, but owing to its accessibility it appears that the Cabinet Forest was the scene of greater logging activities which accounts for the younger stands. The 1910 fire was also more severe on the Cabinet Forest.

Ribes Conditions

The three species of Ribes found on the Kootenai and Cabinet forests are named in order of their predominance. They are: R. lacustre, R. viscosissimum and Grossularia inermis. There is, however, a very noticeable difference in the number of Ribes occurring on similar eradication types of the two forests. On the Cabinet Forest the reproduction and pole eradication types are very short on Ribes. The number of Ribes along the streams on the Kootenai are greater in number than found along the streams on the Cabinet. This scarcity of Ribes may be partly due to the severity of the burns and the more frequent occurrence of fires which have swept over the Cabinet Forest.

TABLE NO. 1

Land Description and Areas Reconnaissanced in Montana

Forest	T.	R.	Intensive Reconn. Sections by Nos.	Sec.	Acres	Extensive Reconn. Sections by Nos.	Sec.	Acres	Total Sec.	Total Acres
Cabinet	24N	34W	1,2,12,	3	1,920					
	25N	33W	19,30,31	3	1,920					
	25N	34W	24,25,26 36	4	2,560					
National Forest	25N	32W	1,2,3,10 15,22,33 19,25,27 29,34.	12	7,680	5,6,7,8, 11,14,22 23,24, 26,	10	6,400		
	26N	33W	9,16	2	1,280	20	1	640		
	26N	34W	35	1	640					
	27N	32W	3,4,5,8, 11,33,34	7	4,480	1,2,6,9, 10,12	6	3,840		
	28N	32W	31,32,34	3	1,920	6,7,18, 19,20,30 33,35	8	5,120		
	28N	33W	29,30	2	1,280	1,12,14, 24,25	5	3,200		
	29N	32W				31,36	2	1,280		
Totals				37	23,680		32	20,480	69	44,160

TABLE No. 1

Land Description and Areas Registered in Names

Parish	Lot	Sheet	Name	Description	Area
Dunmore	1	1			
	2	1			
	3	1			
	4	1			
Montrose	5	2			
	6	2			
	7	2			
	8	2			
Thorne	9	3			
	10	3			
	11	3			
	12	3			
Totals					

TABLE NO. 2

Land Description and Areas Reconnaissanced

Forest	T.	R.	Intensive Reconn. Sections by Nos.	Total Sec.	Total Acres	Extensive Reconn. Sections by Nos.	Total Sec.	Total Acres	Total Sec.	Total Acres
	27N	30W	6,7,18, 19	4	2,560					
	27N	31W	15,1,2, 3,4,11, 12,13,14	9	5,760	21,24,8 9	4	2,560		
Kootenai	28N	31W	2,3,4,5, 9,10,13, 14,15,16 17,18,20 21,22,23 26,27,28 29,35,36	22	14,080	24,25,30 32	4	2,560		
National	29N	32W	10,11,13 16,17	5	3,200	8,9,15, 20	4	2,560		
	32N	32W	2,3,4,8 9,10,11 14,17,20 21,28,26 27,28,34 35.	17	10,880					
Forest	32N	33W	2,3,4,9, 10,11,12 13,21,22 28,29	12	7,680					
	33N	31W	4,5,6,9, 16,17,21	7	4,480					
	33N	32W	23,26,34 35.	4	2,560					
	34N	33W	5,6,7,8, 9,16,17, 19	8	5,120					
Totals				88	56,320		12	76,680	100	64,000

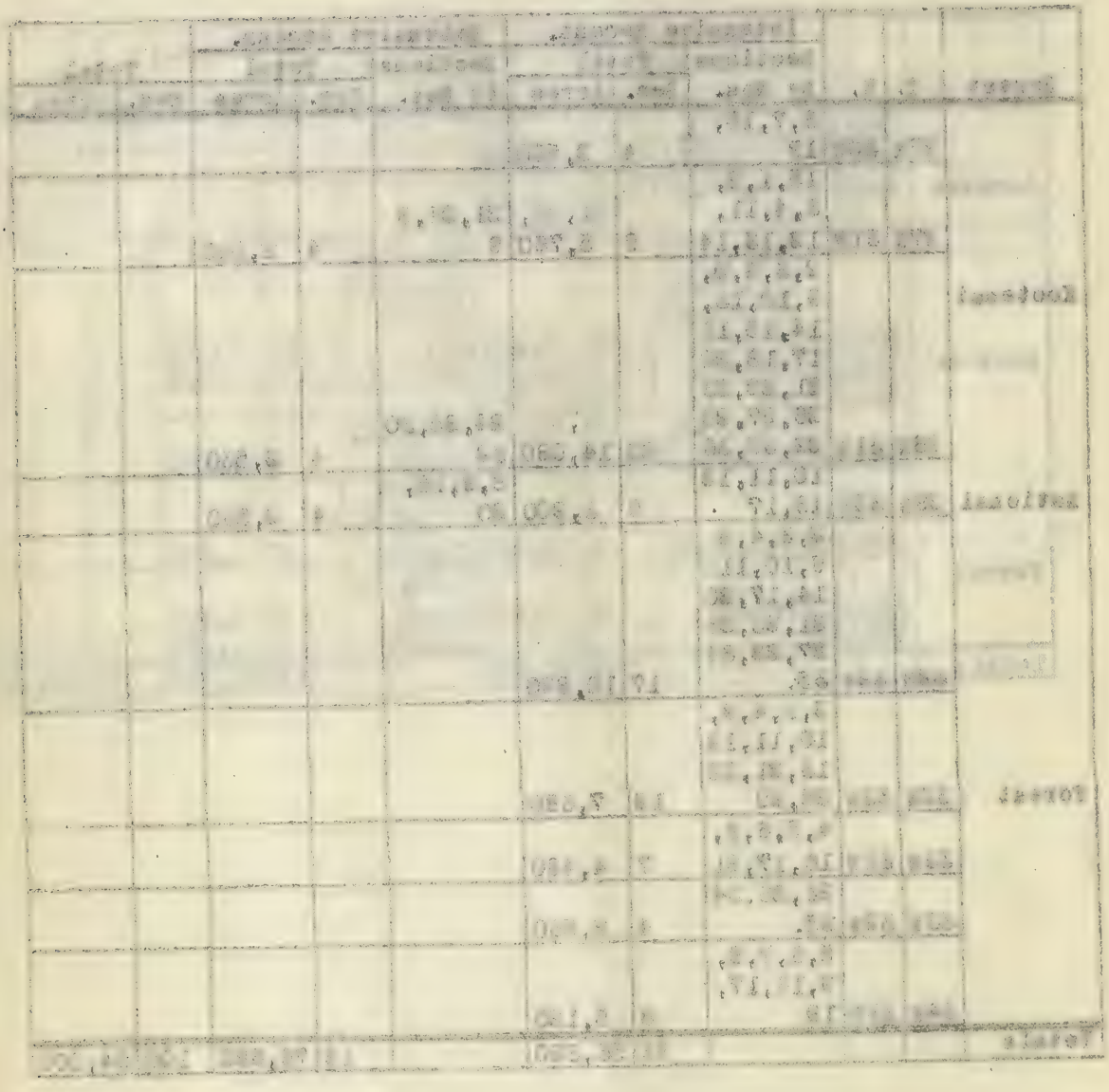


TABLE NO. 3

Total Number of Acres Reconnaissanced--Kootenai National Forest--1927, Classified According to Age, Classes and Eradication Types

Erad. Types	White Pine Type - Age - Classes								
	1-10	11-20	21-40	41-60	61-80	81-100	101-200	201-	Total
D.M.							3,242	680	3,922
O.M.							6,550	3,268	9,818
D.P.			1,572			80			1,652
O.P.		180	5,305		30	75			5,590
D.R.	530	700							1,230
O.R.	355	3,240							3,595
Str.		59	36			7	251	138	501
Total	885	4,179	6,913		30	162	10,053	4,086	*26,308

*In addition to this area there were 37,692 acres of type other than white pine covered by the reconnaissance. These non-white pine areas were not classified into age class or eradication types.

TABLE NO. 4

Number of Acres Intensively Reconnaissanced, Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest

Grad. Types	Number of Ribes lacustre per Acre Classes																			
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	Total
D.M.	1,955	95	640	65	90	135		140			122										3,272
C.M.	475	5,060	1,851	1,440	370	40	206	40	110		28										9,630
D.F.	602	545	295								70										1,512
C.F.	610	1,170	1,730	460	[illegible]	273	105		517	125											4,990
D.R.	150	300	450										150	80							1,130
C.R.	1,337	1,065	880	178	120																3,580
Str. Brush	14	9		11		21			25		14	35	18	33	22	53	31	98	44	36	464
Total	5,173	8,244	5,876	2,154	580	469	311	180	652	125	234	35	138	113	22	53	31	98	44	36	24,568

TABLE NO. 5

Number of Acres Intensively Reconnaissanced, Classified According to Eradication Types and Number of Ribes Per Acre Classes, Kootenai National Forest

Erad. Types	Number of Ribes viscosissimum Per Acre Classes												
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	Total
D.M.	1,985													1,985
O.M.	475													475
D.M.	602													602
O.P.	610													610
D.R.	130	40	40									50		280
O.R.	1,337	310												1,647
Str.	14												5	19
Brush														
Total	5,173	350	40									50	5	5,618

TABLE NO. 6

Number of Acres Intensively Reconnaissanced Classified According to Eradication Types and Number of Ribes Per Acre Classes
Kootenai National Forest

Erad. Type	Number of all Ribes per Acre Classes																			
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	Total
D.M.	1,985	95	640	65	90	135		140			122										3,272
C.M.	475	5,060	1,851	1,440	370	40	206	40	110		28										9,620
D.P.	602	545	295								70										1,512
C.P.	610	1,170	1,730	460		273	105		517	125											4,990
D.H.	150	210	480									50	130	80							1,090
C.H.	1,337	1,065	880	178	120																3,580
Str.	14	9		11		21			25		14	35	24	33	22	53	31	98	44	36	469
Brush																					
Total	5,173	8,154	5,876	2,154	580	469	311	180	652	125	334	85	148	113	22	53	31	98	44	36	24,533

TABLE NO. 7

Distribution of Ribes by Species
Kootenai National Forest

Ribes Species	Per Cent of Total Acres Reconnaissanced Which Has		
	No. Ribes Per Acre	1 to 10 Ribes Per Acre	More Than 10 Ribes Per Acre
R. lacustre	21.1%	33.5	45.4
R. visco.	92.1	6.2	1.7
All Ribes	21.1	33.2	45.7

TABLE NO. 8

Number of Ribes Per Acre By Ribes
Species and Eradication Types
Kootenai National Forest

Erad. Types	Number of Ribes By Species Per Acre			
	Acres Reconn.	R. lacustre	R. visco.	All Ribes
D.M.	3,272	16.9		16.9
C.M.	9,620	17		17
D.F.	1,512	16.3		16.3
C.F.	4,990	18.1		18.1
D.R.	1,090	49.7	17.5	67.2
C.R.	3,580	8.2	.95	9.1
Stream	469	216.2	2	216.2
Brush				
Totals & Averages	24,533	21.1	.913	22

TABLE NO. 9

Total Numbers of Acres Reconnaissanced, Cabinet National Forest - 1927
Classified According to Age, Classes and Eradication Types

Eradication Types	White Pine Types - Age - Classes									Non-white Pine Types - Age - Classes									
	1-10	11-20	21-40	41-60	61-80	81-100	101-200	201+	Total	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Classified	Total
D.M.							1,290	840	2,130							489		3,218	2,707
C.M.							180	4,533	4,713							456	280	2,696	3,432
D.P.			3,875	1,600					5,475									7,798	7,798
C.P.			1,723	380	220				2,323			1,565						6,402	7,967
D.R.		1,230							1,230									3,618	3,618
C.R.		1,110							1,110									1,319	1,319
Stream		69	81	37	4		44	113	348										
Brush																			
Clearing																			
Not Classified																			
Totals		2,409	5,679	2,017	224		1,454	5,536	17,219			1,565				945	280	24,051	26,841

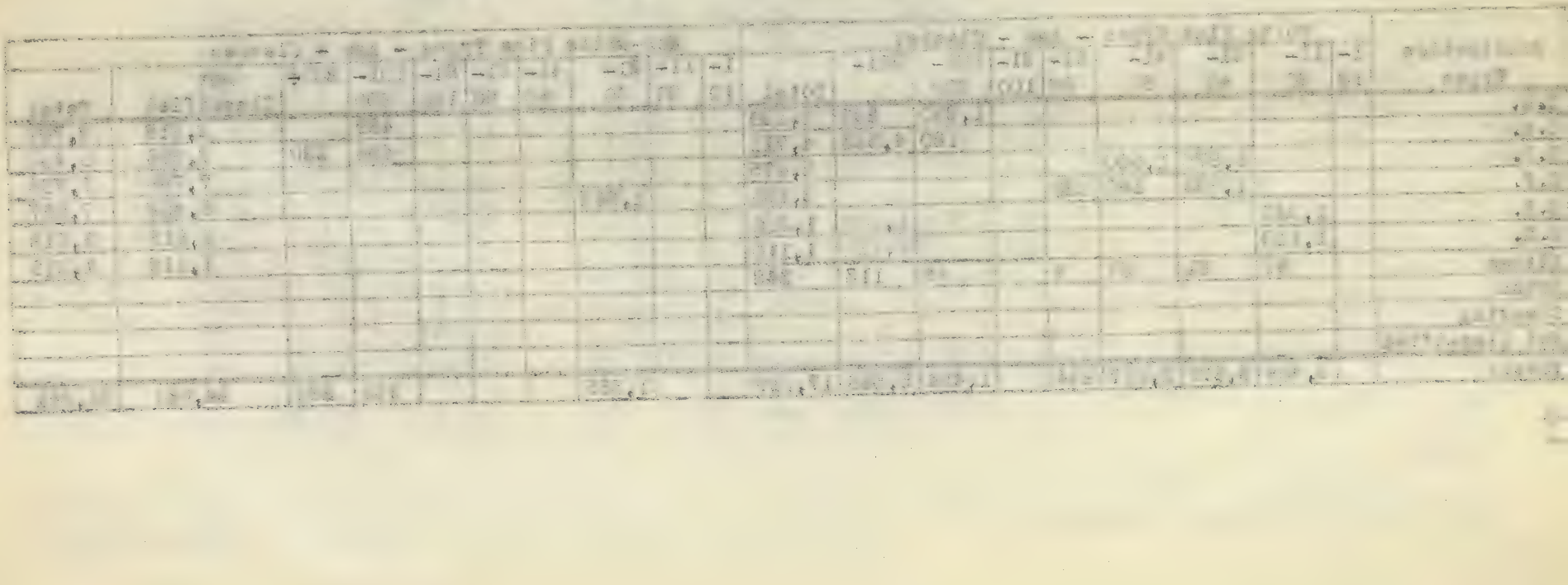


TABLE NO. 10

Number of Acres Intensively Reconnaissanced, Classified According to Eradication Types and Number of Ribes Per Acre Classes, Cabinet National Forest

Erad. Type	Number of Ribes lacustre Per Acre Classes																	
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	Total
D.M.	890	1,130																	2,020
O.M.	1,638	2,135																	3,773
D.P.	2,015	180																	2,195
O.P.	743	170																	913
D.R.	350	230																	580
O.R.																			
Str.	6			9	13	11			9		6	33	21	41	5	25	12	22	213
Total	5,642	3,845		9	13	11			9		6	33	21	41	5	25	12	22	9,694

TABLE NO. 11

Number of Acres Intensively Reconnaissanced Classified According to Eradication Types and Number of Ribes Per Acre Classes Cabinet National Forest

Erad. Type	Number of Grossularia inermis Per Acres Classes. 0	1-10	11-20	21-30	31-40	41-50	Total
D.M.	890						890
O.M.	1,638						1,638
D.P.	2,015						2,015
O.P.	743						743
D.R.	350						350
O.R.							
Stream	6				4		10
Total	5,642				4		5,646

TABLE NO. 12

Number of Acres Intensively Reconnaissanced Classified According to Eradication Types and Number of Ribes Per Acre Classes Cabinet National Forest

Erad. Type	Number of Ribes viscosissimum Per Acre Classes 0	1-10	11-20	Total
D.M.	890			890
O.M.	1,638			1,638
D.P.	2,015	710		2,725
O.P.	743			743
D.R.	350			350
O.R.		490		490
Stream	6	14	6	26
Total	5,642	1,214	6	5,862

TABLE NO. 13

Number of Acres Intensively Reconnaissanced Classified According to Eradication Types and Number of Ribes Classes, Cabinet National Forest

	Number of all Ribes per Acre Classes																	
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	Total
D.N.	890	1,130																	2,020
C.N.	1,638	2,135																	3,773
D.P.	2,015	890																	2,905
C.P.	743	170																	913
D.R.	350	230																	580
C.R.		490																	490
Str.	6	14	6	9	17	11			9		6	35	25	41	5	25	12	23	243
Total	5,642	5,059	6	9	17	11			9		6	35	25	41	5	25	12	23	10,924

Table No. 14

Distribution of Ribes by Species
Cabinet National Forest

Ribes Species	Per Cent of Total Acres Reconnaissanced Which Has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes Per Acre
R. lacustre	58.2%	39.7%	2.1%
G. inermis	99.92%		.08%
R. visco.	82.2%	17.7%	.1%
All Ribes	51.7%	46.3%	2%

Table No. 15

Number of Ribes per Acre by Ribes Species and Eradication Types, Cabinet National Forest

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre			
		R. lacustre	G. inermis	R. visc sissimum	All Ribes
D.M.	2,020	4.1			4.1
O.M.	3,773	1.7			1.7
D.P.	2,905	.45		1.8	2.2
O.P.	913	.7	5.7		6.4
D.R.	580	2			2
O.R.	490			10	10
Stream Brush	243	143.5		1.2	144.7
Totals & Avgs.	10,924	4.8	.5	.95	6.2

TABLE NO. 16

Number of Acres Intensively Reconnaissanced, Classified According to Eradication Types and Number of Ribes Per Acre Classes
All Areas Worked--Montana

Erad. Type	Number R. lacustre per Acre Classes																			
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	Total
D.M.	2,875	1,225	640	65	90	135		140			122										5,292
O.M.	2,113	7,195	1,851	1,440	370	40	206	40	110		28										13,393
D.P.	2,617	725	295								70										3,707
O.P.	1,353	1,340	1,730	460		273	105		517	125											5,903
D.R.	500	530	480										120	80							1,710
O.R.	1,337	1,065	880	178	120																3,580
Stream	20	9		20	11	32			34		20	68	33	74	27	78	43	120	44	36	677
Total	10,815	12,089	5,876	2,163	593	480	311	180	661	125	240	68	159	154	27	78	43	120	44	36	34,262

TABLE NO. 17

Total Number of Acres Reconnaissanced, Classified According to Age Classes and Erudication Types All Areas Forked--Montana 1927

Trad. Types	White Pine Type--Age Classes										Non-white Pine Types--Age Classes					
	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Classified	Total	21-40	101-200	200+	Not Classified	Total	
D.W.							4,472	1,570		6,042		489		2,218	2,707	
C.W.							6,780	7,801		14,581		456	280	2,696	3,432	Cabinet
D.F.			5,447	1,600		80				7,127				7,798	7,798	
C.F.		180	7,028	380	280	75				7,913	1,565			6,402	7,967	
D.R.	580	1,980								2,460				3,618	3,618	National
C.R.	385	4,350								4,705				1,319	1,319	Forest
Stream		128	117	37	4	7	305	251		849				37,962	37,962	Acres on Kootenai Nat'l Forest Not Classified
Brush																
Not Classified																
Total	885	6,588	12,592	2,017	284	162	11,507	9,622		43,627	1,565	945	280	62,013	64,803	

TABLE NO. 18

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types
and Number of Ribes Per Acre Classes
All Areas Worked--Montana

Erad. Type	Number of Ribes viscosissimum Per Acre Classes											
	0	1-10	11-20	21-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	Total
D.M.	2,875												2,875
O.M.	2,113												2,113
D.P.	2,617	710											3,327
O.P.	1,353												
D.R.	500	40	40								50		630
O.R.	1,337	800											2,137
Stream	20	14	6									5	45
Total	10,815	1,564	46								50	5	12,480

TABLE NO. 19

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types
and Number of Ribes Per Acre Classes
All Areas Worked--Montana

Eradication Type	Number of Grossularia inermis Per Acre Classes						
	0	1-10	11-20	21-30	31-40	41-50	Total
D.M.	890						890
O.M.	1,638						1,638
D.P.	2,015						2,015
O.P.	743						743
D.R.	350						350
O.R.							
Stream	6				4		10
Total	5,642				4		5,646

TABLE NO. 20

Number of Acres Intensively Reconnaissanced, Classified According to Eradication Types and Number of Ribes Per Acre Classes
All Areas Worked—Montana

Erad. Type	Number of All Ribes Per Acre Classes																			
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	Total
D.M.	2,875	1,225	640	65	90	135		140			122										5,292
O.M.	2,113	7,195	1,851	1,440	370	40	206	40	110		28										13,393
D.P.	2,617	1,435	295								70										4,417
O.P.	1,353	780	1,730	460		273	105		517	125											5,903
D.R.	500	440	480									50	120	80							1,670
O.R.	1,337	1,555	880	178	120																4,070
Str.	20	23	6	20	17	32			34		20	70	48	74	27	78	43	120	44	36	712
Total	10,815	13,213	5,882	2,163	597	480	311	180	661	125	240	120	168	154	27	78	43	120	44	36	35,457

TABLE NO. 21

Number of Ribes Per Acre by Ribes Species and Eradication Types, All Areas Worked, Montana

Erad. Types	Acres Recon.	Number of Ribes by Species Per Acre R. lacustre	G. inermis	R. viscosissimum	All Ribes
U.E.	5,292	12.1			12.1
U.I.	13,893	17			17
U.P.	4,417	5.8		1.2	7.2
U.R.	5,903	15.4	.9	0	16.4
D.T.	1,670	33.1	0	11.4	44.5
O.P.	4,070	1.2	0	2	3.2
Stream	712	191.3		1.7	193
Total & Avgs.	35,457	16.07	.15	.93	17.1

TABLE NO. 22

Distribution of Ribes by Species All Areas Reconnaissanced, Montana

Ribes Species	Per Cent of Total Acres Reconnaissanced Which Has No. Ribes Per Acre	1-10 Ribes Per Acre	More Than 10 Ribes Per Acre
R. lacustre	31.6%	35.3%	33.1%
G. inermis	99.9%	0 %	.1%
R. visco.	66.6%	12.5%	.9%
All Ribes	30.6%	37.3%	32.0%

Table No. 23

Comparison of Ribes Data by National Forests, Montana

Forest	Acres Intensively Reconn.	Per Cent of Total Acres Reconnaissanced, Which Has		
		No Ribes Per Acre	1-10 Ribes Per Acre	More Than ten Ribes Per Acre
Kootenai National Forest	24,533	21.1%	33.5%	45.4%
Cabinet National Forest	10,924	51.7%	46.3%	2%
All Areas	35,457	30.6%	37.2%	32.2%

Table No. 24

Number of Ribes per Acre on National Forests, Montana

Forest	Acres Intensively Reconn.	Average Number of Ribes by Species per Acre			
		R. lacustre	R. visco.	G. inermis	Total Ribes
Kootenai National Forest	24,533	21.1	.913		22
Cabinet National Forest	10,924	4.8	.95	.5	6.2
All Areas	35,457	16	.92	.15	17.1

Item	Acres Estimated	Per Cent of Total Acres Harvested, Which is Cut	Per Acre Yield	Value Per Acre
Southern Railroad System	74,019	81.12	19.61	$21.08
Southwestern Express Company	14,054	81.71	20.81	[illegible]
All Others	69,487	83.65	19.44	$19.96

Item	Acres Estimated	Per Cent of Total Acres Harvested, Which is Cut	Average Number of Bales Per Acre	Total Value
Southern Railroad System	20,137	81.2	.813	$8
Southwestern Express Company	10,071	84.1	.96	6.4
All Others	20,487	1.6	.92	37.1

PRE-ERADICATION SAVENAC NURSERY

C. H. Johnson
Assistant Pathologist

The pre-eradication work at Savenac Nursery was completed during the later summer so all is now in readiness to commence Ribes eradication as soon as the weather permits. The work at Savenac is principally a stream type eradication job. Areas exclusive of the stream are practically Ribes free.

The acreage of the stream type for a distance of one mile in every direction from the nursery was computed and all areas exclusive of stream type for a distance of one-half to one mile from the nursery scouted for Ribes. It remains to be determined which of the two methods, hand eradication or chemicals, will be resported to on the various streams. It is, however, an assured fact that both methods will be employed.

[illegible] Stress Survey

C. E. Libman
Assistant Professor

The pre-examination work of Surveys Survey was completed during the later summer so all is now in readiness to commence wind-ventilation as soon as the weather permits. The work of Surveys is principally a stress type examination job. Survey engineers of the stress are practically blind free.

The coverage of the stress type for a distance of one mile in every direction from the Armory was computed and all kinds of climates of stress type for a distance of one-half to one mile type the Armory nominal for wind. It results is be Conservers exist of the two methods, hand examination of specific, will be depicted to on the various streams. It is, however, to assure that this methods will be employed.

SCOUTING FOR BLISTER RUST NORTHWESTERN MONTANA

By
C. H. Johnson
Assistant Pathologist

Scouting for the blister rust was conducted in western Montana along all the important drainages. Considerable scouting was done in the northwestern part of the state along the international boundary. A large number of Ribes nigrum, and other wild species, were inspected in British Columbia principally along the Kootenai River. Inspections on cultivated black currants were made as far west as Cranbrook, British Columbia.

Following are the principal drainages scouted with species of Ribes found:

TABLE NO. 1

Scouting for the Disease Northwestern Montana
September and October 1927

Locality	Ribes Species Found	Number Inspected							
		R. nigrum	R. petiolare	R. cereum	R. lacustre	R. americanum	R. visco.	G. inermis	G. setosa
Bitter Root and Missoula Rivers & tributaries	R.nigrum, R.petiolare, R.cereum, R.lacustre, G.setosa, G. inermis	200	1,540	6	740	25	0	2	26
Thompson and Clarks Fork rivers	R.americanum, R.lacustre, G.inermis	965	12		396	4	30	471	0
Bull River and tributaries	R.lacustre, R.visco. G.inermis				281		50	122	
Flathead River and tributaries	R.nigrum, R.petiolare R.lacustre	30	134		737		42	167	
Stillwater River and tributaries	R.petiolare, R.lacustre, R.visco. G. inermis		10		836		62	321	
Kootenai River and tributaries in Montana and British Columbia	R.nigrum, R.lacustre R.visco. G.inermis	1,400			560			2,630	

BLISTER RUST CONTROL WORK IN IDAHO
1927

The following is the memorandum of understanding under the terms of which the work in Idaho has been organized:

MEMORANDUM OF UNDERSTANDING
between
THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and the
IDAHO STATE DEPARTMENT OF AGRICULTURE - - - UNIVERSITY OF IDAHO
IDAHO STATE BOARD OF FORESTRY - - - POTLATCH TIMBER PROTECTIVE ASSOCIATION - - - CLEARWATER TIMBER PROTECTIVE ASSOCIATION - - - COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION - - - PEND OREILLE TIMBER PROTECTIVE ASSOCIATION - - - and THE PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION
relative to
Cooperative White Pine Blister Rust Control Work in Idaho.
Effective July 1, 1927.

----------oOo----------

A. The BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. The IDAHO STATE DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease; and

(3) Undertake such destruction of white pine or Ribes in Idaho and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work.

C. The UNIVERSITY OF IDAHO agrees to:

(1) Detail one member of the staff of the School of Forestry to this work throughout the field season and to permit him sufficient time during the rest of the year to supervise generally such work in Idaho;

(2) Make such studies, so far as the other duties of the staff of the School of Forestry will permit, as are considered necessary and advisable on the rate of growth of western white pine remaining on areas after logging, and the expected yield of second growth white pine stands;

(3) Examine, through the Department of Plant Pathology, all specimens suspected of being infected with the white pine blister rust when sent in by the field scouts and others, and keep the necessary records of such collections and examinations;

(4) Assist the Bureau of Plant Industry, through the University Extension Service, so far as practicable in the educational activities necessary to the effective conduct of the work.

D. The IDAHO STATE BOARD OF FORESTRY agrees to:

(1) Cooperate through its deputized agents, insofar as their other duties permit, in systematically locating cultivated black currants, scouting for white pine blister rust, and locating infected or potentially infected host plants;

(2) Cooperate directly, insofar as practicable, in promoting and assisting the various blister rust control activities carried on in the State.

E. The POTLATCH TIMBER PROTECTIVE ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

F. The CLEARWATER TIMBER PROTECTIVE ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

[illegible]:

(1) Detail one member of the staff of the School of Forestry to this work throughout the field season and to permit him sufficient time during the rest of the year to supervise generally such work in Idaho;

(2) Make such studies, so far as the other duties of the staff of the School of Forestry will permit, as are considered necessary and advisable on the rate of growth of western white pine remaining on areas after logging, and the expected yield of second growth white pine stands;

(3) Provide, through the Department of Plant Pathology, all specimens suspected of being infected with the white pine blister rust when sent in by the field agents, and study the laboratory records of such collections and evaluations;

(4) Assist the Bureau of Plant Industry, through the University Extension Service, so far as practicable in the educational activities necessary to the effective conduct of the work.

2. The [illegible] agrees to:

(1) Cooperate through its deputized agents, insofar as their other duties permit, in systematically inspecting cultivated black currants, scouting for white pine blister rust, and learning infected or potentially infected host plants;

(2) Complete [illegible], insofar as practicable, in printing and assisting the various blister rust control activities carried on in this State.

3. The [illegible] agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the [illegible], and determining by field survey the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

4. The [illegible] agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field survey the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

G. The COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

H. The PEND OREILLE TIMBER PROTECTIVE ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

I. The PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing complete information concerning the age and quantity of white pine second growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

J. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated at any time by any one of the parties hereto by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Idaho;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be reported promptly to all other parties to this agreement, and that all specimens collected by any party to this agreement

6. The [illegible] ASSOCIATION agrees to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing information concerning the age and quantity of white pine growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

7. The [illegible] AGREES to:

(1) Contribute the services of its employees, insofar as their other duties will permit, in systematically locating cultivated black currants, scouting for the white pine blister rust on the forest lands of the Association, securing information concerning the age and quantity of white pine growth on logged-off and burned-over land of the Association, and determining by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands as a basis for determining the cost and feasibility of local control of white pine blister rust on these lands.

8. It is [illegible]:

(1) This memorandum may be terminated at any time by any one of the parties hereto by written notice, and may be amended by written mutual agreement;

(2) The [illegible] of work in this memorandum will be followed as to the control of white pine blister rust in [illegible]

(3) All [illegible] reports of work performed under this agreement shall be made in duplicate by or at [illegible] to this agreement, and all findings of blister rust made by any party to this agreement shall be reported promptly to all other parties to this agreement, and that all conclusions collected by any party to this agreement, and that all conclusions collected by any party to this agreement [illegible] of white pine blister rust on these lands.

which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by one of the cooperating parties, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticised by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for host plants destroyed in control work; and

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $78,000 to the support of this cooperative work, the Idaho State Department of Agriculture shall contribute in value approximately $1,100, the University of Idaho approximately $4,000, the Potlatch Timber Protective Association approximately $3,800, the Clearwater Timber Protective Association approximately $3,800, the Coeur d'Alene Timber Protective Association approximately $3,800, the Pend Oreille Timber Protective Association approximately $3,800, and the Priest Lake Timber Protective Association approximately $4,340; thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:	Signature:
7-20-27	(s.) John S. Welch Commissioner, Idaho State Department of Agriculture.
July 31, 1927	(s.) F. G. Miller University of Idaho.
Aug. 9, 27	(s.) Ben E. Bush State Forester, Idaho State Board of Forestry.
Aug.25-27	(s.) A. W. Laird President, Potlatch Timber Protective Association.
Sept.12-27	(s.) Theo Fohl Secy-Treas.,Clearwater Timber Protective Association.
Sept.16-27	(s.) Sig Hofslund Secretary, Coeur d'Alene Timber Protective Association.
Sept.21-27	(s.) T. L. Greer Secretary, Pend Oreille Timber Protective Association.
Sept.27-27	(s.) J. Jensen Secretary, Priest Lake Timber Protective Association.
Oct.5, 1927	(s.) Wm. A. Taylor Chief, Bureau of Plant Industry.

Date	Signature
7-23-57	(s.) John C. Doe
Date 81 Mar	(s.) T. R. Miller
Mar.1,'61	(s.) Jos L. Doe
Jan.15-57	(s.) A. C. Pair
Feb.15-57	(s.) Geo. Doe
Feb.1-57	(s.) Ja Delano
Mar.31-57	(s.) T. J. Brown
Apr.1-57	(s.) Geo.
Apr.15,'57	(s.) E. A. Taylor
Oct.8, 1957	(s.) E. A. Taylor

REPORT ON BLACK CURRANT ERADICATION WORK IN IDAHO

by
C. R. Stillinger
Associate Pathologist

The eradication of the black currant in Idaho during 1927 was carried out as a cooperative project between the Bureau of Plant Industry, U. S. Department of Agriculture, and the Idaho State Department of Agriculture, under the terms of the cooperative agreement between these two agencies for the fiscal year of 1927 and 1928.

I. Object of the Project.

The object of the project during 1927 has been to continue the thorough eradication of the cultivated black currant in that portion of Idaho which had not been eradicated as well as to check the work which had been done in the northern counties.

II. Personnel

Eight men and 4 cars were employed in this work. Two men with one car did the rechecking work in northern Idaho from May 2 until August 1. Six men with three cars did eradication work in southern Idaho from June 30 to September 10.

III. Results.

The black currant eradication program was completed at the end of this season. During 1927 the following plantings were eradicated:

County	Number of Plantings	Number of Bushes
Bannock	60	711
Bear Lake	95	764
Benewah *	1	4
Bonner *	8	42
Boundary *	12	48
Caribou	10	126
Franklin	50	526
Fremont *	17	115
Kootenai *	10	69
Madison	9	83
Oneida	87	798
Shoshone *	17	57
Teton	42	442
Totals	428	3,754

* Counties in which recheck work was done. All of Idaho north of the St. Joe River was rechecked, as well as all of Fremont, Butte and part of Custer county in southern Idaho. Most of the bushes that were found on the recheck were from two to four years old.

Section I

OUTLINE OF RESEARCH WORK FOR 1927-1928

By

H. R. Offord,
Agent

After a careful survey of chemical eradication work as it now stands, four very important facts present themselves for our consideration. They are:

1. R. petiolare can be more efficiently and economically eradicated by chemical than by hand pulling.

2. G. inermis and R. lacustre have not been efficiently eradicated by chemical as yet.

3. G. inermis and R. lacustre are frequently associated with R. petiolare and should be included in any emergency delay program involving the eradication of this type.

4. The present cost of chemical and the concentration of this chemical which is used at present can be cut in half if we could set up the proper conditions in a more dilute solution.

The explanation of the difference in reaction on the part of the species mentioned is a fundamental one and the solution of the problem lies in the field of research. The need is a vital and urgent one, and at the termination of our field season our program of research should be pushed ahead with all possible speed and assistance. The help of men trained in chemistry, physiology and botany and who are familiar with the problem of blister rust will be necessary in order to carry out the research work outlined as follows:

A. Material for Experimental Work

1. Root and stem cuttings of G. inermis and R. petiolare gathered by Rockie and Bell in Idaho. Part of these plants to be started at once in the greenhouse, part to be planted at once out-of-doors and remainder to be kept in cold storage over the winter and started in early spring.

2. Leaves and stems of R. petiolare, G. inermis, R. lacustre and R. viscosissimum. Gathered in Idaho following instructions sent by wire to Mr. Wyckoff.

3. Ribes seedlings of each of the above four species to be grown on sand cultures in greenhouse at California, gathered by Rockie and Bell in Idaho.

4. R. nigrum obtained by Mr. Root in California.

Section I

OUTLINE OF RESEARCH WORK FOR 1927-1928

H. K. Offord,
Agent

After a careful survey of chemical eradication work as it now stands, four very important facts present themselves for our consideration. They are:

1. R. [illegible] can be more efficiently and economically eradicated by chemical than by [illegible] methods.

2. R. inermis and R. laevistre have not been efficiently eradicated by chemical as yet.

3. R. inermis and R. laevistre are frequently associated with R. multiflora and should be included in any emergency delay program involving the application of a [illegible] type.

4. The present cost of chemical and the concentration of the chemical which is used at present can be cut, if not, if we could see the proper conditions in a more [illegible] solution.

The explanation of the difference in results as the part of the species mentioned is a fundamental one and the solution of the problem lies in the field of research. The need is a vital and urgent one, and at the termination of our C.W.A. [illegible] program of research should be pushed ahead with all possible speed and insistence. The help of men trained in chemistry, physiology and botany and who are familiar with the problem of nitrate root wall be necessary in order to carry out the research work outlined as follows:

1. Material for Experimental Work

1. Root and stem cuttings of R. inermis and R. multiflora gathered by Rocky and Bell in Idaho. Part of these plants to be started at once in the greenhouse, part to be planted at once out-of-doors and remainder to be kept in cold storage over the winter and started in early spring.

2. Leaves and stems of R. [illegible], R. inermis, R. laevistre and R. viscosissima. Gathered in Idaho following instructions sent by mail in a [illegible].

3. Ripe seedlings of each of the above four species to be grown on sand cultures in greenhouse at California, gathered by Rocky and Bell in Idaho.

5. Cultivated red currants (if necessary) purchased from California nurseries.

B. Morphology

This field should provide the anatomical data which are factors in the difference of susceptibility to chemical treatment and will be invaluable in our studies of Ribes Ecology and of disease host plants. Both leaves and stems should be studied as:

1. A detailed study of the stomata and lenticels of the above four species. This comparative study to cover size, number, and manner of distribution of stomata and lenticels. Work performed by Patty.

2. A comparative study of the morphology of stem of the above Ribes. Work by Patty.

C. Physiology

Data of this sort are necessary to bridge the gap between botanical and chemical data, and will enable us to make a much more extensive application of our results.

1. Physiological studies of the structure and composition of Ribes tissue employing the micro-chemical technique as worked out by J. F. Priestley at the University of Leeds, England. If work can not be satisfactorily done in England, a fellowship might be established by the International Education Board.

D. Chemistry

Comprises the bulk of our investigational work and intends to answer the following important questions:

1. How can we establish a measuring stick to express the toxicity of a chemical on Ribes?

2. What is the nature of this toxic action on the Ribes tissue?

3. Under what conditions of temperature, moisture and light (field conditions) is this toxic action optimum?

The work outlined is as follows:

I. Absorption studies - Offord and d'Urbal with advice of Dr. Hoagland.

a. Ribes to be grown on sand cultures and provided with nutrient

4. Published two articles (2 manuscripts) produced from California materials.

5. Activities

This field should provide the suggested data which are features in the difference of susceptibility to chemical treatment and will be invaluable in our studies of lipse [illegible] and of diseases [illegible] Data items and items should be listed as:

1. A checklist study of the climate and [illegible] of the native four counties. This comparative study by [illegible] and summer of distribution of climate and [illegible]. Data [illegible] by Yates.

2. A comparative study of the morphology of [illegible] of the white mites. Work by Levin.

6. Furnish

[illegible] with are requested by [illegible] the [illegible] Subsidi and chemical lab, and all [illegible] to [illegible] [illegible] [illegible]

solutions.

b. Careful experiments to see if Ribes can be killed by application of the chlorate to leaves and stems.

c. Ribes seedlings on sand cultures to be treated with chlorate under varying conditions of light and moisture. These experiments to be duplicated using the relatively non-toxic chloride.

d. Ribes seedlings on sand cultures to which are added nutrient solutions containing various amounts of chlorate to determine the action of the toxic anion if it enters through the roots.

e. Addition of varying amounts of manganese (known to stimulate oxidation in plant tissue) to the chlorate sprays and to the nutrient solutions. Traces of iron and ethylene gas to be considered.

f. Testing of chlorate sprays containing different and known concentrations of the hydrogen ion.

g. Analysis of specimens of R. petiolare and G. inermis stem sampled from sprayed bushes at Bovill, Idaho. Ribes sprayed with sodium chlorate to be compared with controls in each case.

h. Absorption studies on Nitella. Work on this cell which does not present the same difficulties as the more complex higher plants will give us data on the action of the chlorate ion on cell organization. Material collected in Golden Gate Park, San Francisco.

II. Chemical analysis of Ribes

A gross analysis of Ribes tissue must be made before we can attack the problem of difference in susceptibility of various species, from the chemical side. After an analysis of the normal healthy plants has been made, Ribes plants should be taken at several points along the death curve and a similar analysis made. This work should be done preferably by a trained plant chemist at the University of California with the advice of Professor Dore. Analyses to be made according to existing technique and to include determination of: Cutin, suberin, lignin, pectic substances, cellulose, carbohydrates, tannins, alkaloids, essential oils, glucosides, etc.

III. Ultimate analysis of technical grades of sodium chlorate to determine what impurities they contain. A trace of iron or manganese may be catalysing the action of the technical grade of chlorate which is better than that of the C. P. Work by Youden and Offord.

IV. Investigation of the possibility of determining quantitavely mixtures of chloride and chlorate present as such in Ribes tissue by some method other than oxidation of the organic material. Work by Youden and Offord.

V. Investigation of the action of two oxidizing agents. Application of one type (caustic) to partially break down the cuticle before application of the passively oxidizing agent ($NaClO_3$). Particular attention to G. inermis.

Acknowledgements

The writer particularly wishes to thank the Division of Forestry in the person of Dr. Mulford, and the Division of Plant Nutrition in the person of Dr. Hoagland for their assistance and helpful suggestions both in the work carried out during the past winter and in the preparation of work for the coming winter.

REPORT ON THE INVESTIGATION OF THE TOXIC ACTION OF HALOGEN AND OXY-HALOGEN COMPOUNDS AS RELATED TO THE CHEMICAL ERADICATION OF RIBES

Purpose of the Investigation

Analysis of the results of field experiments shows that even our best killing agent varies considerably in its action on Ribes. Factors of temperature, sunlight, moisture and chemical composition of the soil, which factors are responsible for the physiological condition of the plant, very probably explain this difference in susceptibility to various toxic agents.

This research program has been instituted in the hopes of determining the "mechanism of action" of our chemicals on Ribes, and to determine if possible, under what conditions of sunlight, moisture and soil this action is optimum. A satisfactory understanding of this basic problem is vital to the intelligent management of our field work and should be the foundation upon which our permanent methods of control work are based.

With these ideas in view, the Office of Blister Rust Control through the cooperation of the Division of Forestry and Division of Plant Nutrition, University of California, who provided office, greenhouse, and laboratory space, started work on this program of research in September, 1926.

Preparation of Plant Material

Several thousand root cuttings of each of the species of R. petiolare, G. inermis and R. lacustre were shipped from Idaho to California in the early fall of 1926. The greater portion of this material was planted in a tract of land allotted to us by the Forestry Division of the University of California. These plants showed promise shortly after planting, but a period of frost, followed by several weeks of very heavy rains killed most of the cuttings. Species of R. hellii (14), R. cereum (12), R. nevadense (8), and G. roezli (15), which were sent to Berkeley

7. Investigation of the action of two oxidizing agents. Application of one type (agent) to partially break down the cuticle before application of the passively oxidizing agent (MnO2). Particular attention to I. leaves.

Acknowledgments

The writer particularly wishes to thank the Division of Forestry [illegible] the person of Dr. Bedford for their assistance and helpful suggestions [illegible] in the work carried out during the past winter and in the preparation of [illegible] work for the coming winter.

Factors of the Investigation

Analysis of the locality of field experiments seems last even our best skilled agent varies considerably in the action on Ribes. Factors of temperature, [illegible] light, moisture and chemical composition of the soil, which factors are responsible for the physiological condition of the plant, very probably explain this difference in susceptibility to various soils equally.

This requires finding out [illegible] in the action of determining the "resistance of action" of our chemicals on Ribes, and to determine if possible, under what conditions of sunlight, moisture and soil this action is optimum. A satisfactory understanding of this basic problem is vital to the intelligent management of our field work and should be the foundation upon which our permanent methods of control work are based.

[illegible] these ideas in view, the Office of Blister Rust Control through the cooperation of the Division of Forestry and Division of Plant Pathology, University of California, who provided office, greenhouse, and laboratory space, started work on this program of research in September, 1940.

Description of Plant Material

Several thousand test seedlings of each of the species of Ribes petiolare, R. lacustre and R. [illegible] were obtained from Idaho in California. The great portion of this material was planted in a trial at Berkeley in the Forestry Division of the University of California. These plants showed promise shortly after planting, but a period of frost, followed by several weeks of very hot [illegible] weather killed most of the seedlings. Remnants of R. petiolare [illegible], R. lacustre [illegible], and R. [illegible] were [illegible] which were sent in [illegible]

from eastern California did not survive under greenhouse conditions. Sixty-eight R. petiolare, 54 G. inermis and 48 R. lacustre were also carefully potted, but only a few healthy, vigorous plants were obtained from these specimens. None of the wild material was subsequently used in the experimental work. After failure to obtain a supply of wild Ribes, some cultivated red currants were purchased from a local nursery and under greenhouse conditions soon reached a stage of development suitable for experimental work.

Working Over of the Laboratory Technique.

Since the writer was chiefly interested in the action of $NaClO_3$ and NH_4Cl on Ribes, it was decided to study the absorption, if any, of chemicals of this toxic type and compare it with the absorption of the non-toxic type such as NaCl and KBr. The halogens readily lent themselves to quantitative measurements, so it was purposed to use a quantitative measurement of the halogen content of Ribes tissue as an indicator of the amount of absorption.

The technique used was essentially that of P. L. Hibbard, Ind. Eng. Chem. Vol. 18, and it was found to be quite satisfactory even when a large amount of organic matter was present in the sample taken for analysis. In the summary of the procedure, several minor changes are noted in the quantity of reagents used and in one or two small details of the apparatus. Blank solutions containing known amounts of chlorides, chlorates, bromides and bromates were used to test the accuracy of the procedure. Table I gives a few of the data which are indicative of results obtained.

Table I

C.C. 0.01N $Na_2S_2O_3$	Halogen Taken Mg.	Halogen Found Mg.	Error in Mg.	Remarks
5.67	Br. - 4.610	Br. -4.526	-0.084	KBr used
5.73	" - 4.610	" -4.584	-0.026	" "
2.28	" - 1.844	" -1.824	-0.020	" "
2.65	" - 1.844	" -2.120	+0.276	" "
2.23	" - 1.844	" -1.784	-0.060	" "
12.70	Cl. - 6.00	Cl. -4.510	-1.490	NaCl "
12.66	" - 6.00	" -4.49	-1.51	" "
12.60	" - 6.00	" -4.48	-1.52	" "
25.32	" -10.70	" -8.99	-1.71	$NaClO_3$"
11.93	" - 4.28	" -4.24	-0.04	" "
3.18	Br. - 2.42	Br. -2.54	+0.12	$KBrO_3$ "
2.89	" - 2.42	" -2.31	-0.11	" "
2.93	" - 2.42	" -2.34	-0.08	" "

Blank tests on reagents and untreated Ribes stems were run. Average results were as listed on Table II.

Table II

C.C. 0.01N $Na_2S_2O_3$	Material Tested	% of Halogen Found
None	Ribes stem untreated	Bromine - None
1.29	Ribes stem untreated	Chlorine -0.622
.84	Total - Reagent	Chlorine -0.405
.86	Total - Reagent	Chlorine -0.413
.75	Total - Reagent	Chlorine -0.365
None	Ribes stem untreated	Bromine - None

In this manner the proper technique for the quantitative determination of halogen in Ribes stem was worked over until the writer was satisfied as to the accuracy of his work.

Treatment of Plant Material

Cultivated red currants and subsequently a few cultivated black currants were used in the experiments. Four series of experiments were carried out, viz:-

1. Plants placed in greenhouse under normal greenhouse light and given 1/2 liter of distilled water per week.

2. Plants placed in greenhouse under normal greenhouse light and kept without water after the application of the chemical.

3. Plants placed in dark box in greenhouse and kept without water after application of the chemical.

4. Plants left outside under normal conditions of light and moisture.

The plants of each of the series were treated with the chemicals according to one or all of the following plans:

Application to:

1. Upper and lower leaf surface and stem.
2. Upper leaf surface and stems.
3. Stems alone.
4. Leaves alone.

In each of the above instances, the pots were covered with a large piece of filter paper and paraffin paper to preclude the possibility of the chemicals poisoning the soil. A small atomizer was used in order to accurately apply the mist spray. The chemical was applied

Table 1

to the stems alone by means of a small camel's hair brush. In order to get a fine spray upon the leaves, it was found necessary to first carefully wrap the aerial stems of the plant in a layer of filter paper and then a covering of paraffin paper. Tables III, IV, V, VI, VII, summarize the greenhouse data:

			Species
		Leaves of upper and lower surfaces and stems	Cultivated red currant
		Leaves of upper surface and stems	" " "
		Stems only	" " "
		Leaves of upper and lower surfaces and stems	" " "
		Leaves of upper surface and stems	" " "
		Stems only	" " "
		Leaves of upper and lower surfaces and stems	" " "
		Leaves of upper surface and stems	" " "
		Stems only	" " "
		Leaves of upper and lower surfaces and stems	" " "
		Leaves of upper surface and stems	" " "
		Stems only	" " "
		Leaves of upper and lower surfaces and stems	" " "
		Leaves of upper surface and stems	" " "
		Stems only	" " "
		Leaves only	" " "
		Leaves only	" " "
		Leaves only	" " "
		Leaves only	" " "
		Control (no treatment)	" " "

Table IV

Table III

Plants given ½ liter distilled water per week and kept under normal greenhouse light.

Chemical Used and Concentration	Plant No.	Applied To	Species
$NaClO_3$ - 20%	1	Leaves of upper and lower surface and stems	Cultivated red currant
" "	2	Leaves of upper surface and stems	" " "
" "	3	Stems only	" " "
KBr - 5%	4	Leaves of upper and lower surface and stems	" " "
" "	5	Leaves of upper surface and stems upper and lower	" " "
" "	6	Stems only	" " "
$KBrO_3$ - 3.1%	7	Leaves of upper and lower surface and stems	" " "
" "	8	Leaves of upper surface and stems	" " "
" "	9	Stems only.	" " "
NaCl - 10%	10	Leaves of upper and lower surface and stems	" " "
" "	11	Leaves of upper surface and stems	" " "
" "	12	Stems only	" " "
NH_4Cl - 20%	13	Leaves of upper and lower surface and stems	" " "
" "	14	Leaves of upper surface and stems	" " "
" "	15	Stems only	" " "
" "	16	Leaves only	" " "
$NaClO_3$ "	17	Leaves only	" " "
KBr - 5%	18	Leaves only	" " "
$KBrO_3$ - 3.1%	19	Leaves only	" " "
NaCl - 10%	20	Leaves only	" " "
None	37	Control - no treatment	" " "

Table IV

Plants kept without water in dark box.

Chemical Used and Concentration	Plant No.	Applied To	Species
$NaClO_3$ - 20%	21	Leaves - upper and lower surface and stems	Cultivated red currant
" "	22	Stems alone	" " "
KBr - 5%	23	Leaves - upper and lower surface and stems	" " "
" "	24	Stems alone	" " "
$KBrO_3$ - 3.1%	25	Leaves - upper and lower surface and stems	" " "
" "	26	Stems alone	" " "
NaCl - 10%	27	Leaves - upper and lower surface and stems	" " "
" "	28	Stems alone	" " "
NH_4Cl - 20%	29	Leaves - upper and lower surface and stems	" " "
" "	30	Stems alone	" " "
None	36	Control - no treatment	" " "

Table V

Plants kept without water under normal greenhouse light.

Chemical Used and Concentration	Plant No.	Applied To	Species
$NaClO_3$ - 20%	31	Leaves- upper and lower surface and stems	Cultivated red currant
KBr - 5%	32	Leaves - upper and lower surface and stems	" " "
$KBrO_3$ -3.1%	33	Leaves - upper and lower surface and stems	" " "
NaCl - 10%	34	Leaves - upper and lower surface and stems	" " "
NH_4Cl - 20%	35	Leaves - upper and lower surface and stems	" " "
None	38	Control - no treatment	" " "

Table VI

Plants placed outside under normal conditions of light and moisture

Chemical Used and Concentration	Plant No.	Applied to	Species
$NaClO_3$ - 20%	39	Leaves - upper and lower surface and stems	Cultivated red currant
$KBrO_3$ -3.1%	40	Leaves - upper and lower surface and stems	" " "
NH_4Cl - 20%	41	Leaves - upper and lower surface and stems	" " "
None	42	Control - no treatment	" " "
$NaClO_3$ - 20%	46	Leaves - upper and lower surface and stems	" black "
" "	48	Leaves - upper and lower surface and stems	" red "
" "	49	Leaves - upper and lower surface and stems	" " "

Table VII

Plants given ½ liter of distilled water per week and kept under greenhouse light.

Chemical Used and Concentration	Plant No.	Applied to	Species
$NaClO_3$ - 20%	43	Leaves - upper and lower surface and stems	Cult. black currant
$KBrO_3$ -3.1%	44	Leaves - upper and lower surface and stems	" " "
NH_4Cl - 20%	45	Leaves - upper and lower surface and stems	" " "
None	47	Control - no treatment	" " "

Notes on Treatment of Plants

1. $NaClO_3$ -20% by volume contained 0.6% by volume of glue, added as a sticker and spreader.
KBr - 5% by volume contained 0.3% by volume of glue.
$KBrO_3$- 3.1% by volume contained 0.3% by volume of glue.
NaCl - 10% by volume contained 0.4% by volume of glue.
NH_4Cl - 20% by volume contained 0.6% by volume of glue.

2. Plants 1-47 (except controls) were treated in late afternoon, during bright, warm weather.

3. Plants 39-41 were sprayed inside greenhouse and then placed out-of-doors. A heavy rainstorm occurred during the first night of the experiment.

Table II

Chemical Used and Concentration	Plant No.	Applied to	Results
$MnCl_2$ - 2%	43	Leaves - water and lower surfaces and stems	Unaffected as Control
$ZnCl_2$ - 0.1%	40	Leaves - water and lower surfaces and stems	" " "
NH_4Cl - 2%	41	Leaves - water and lower surfaces and stems	" " "
Lime	42	Control - no treatment	" " "
$MnCl_2$ - 2%	46	Leaves - water and lower surfaces and stems	Black "
0 " "	45	Leaves - water and lower surfaces and stems	" " "
0 " "	49	Leaves - water and lower surfaces and stems	" " "

Table III

Plants given ½ liter of distilled water per week and kept under [illegible] light.

Chemical Used and Concentration	Plant No.	Applied to	Results
MnO_2 - 2%	47	Leaves - water and lower surfaces and stems	Cont. 27 of warrant
$ZnCl_2$ -0.1%	44	Leaves - water and lower surfaces and stems	" " "
NH_4Cl - 2%	48	Leaves - water and lower surfaces and stems	" " "
Lime	42	Control - no treatment	" " "

Notes on Treatment of Plants

1. $MnCl_2$ - 2% by volume contained 0.6% by volume of Zinc, added as a wetter and spreader.
   $ZnCl_2$ - 0.1% by volume contained 0.3% by volume of Zinc.
   NH_4Cl - 2% by volume contained 0.6% by volume of Zinc.
   Lime - 20% by volume contained 0.6% by volume of Zinc.

2. Plants 1-47 (except control) were treated in late afternoon, during bright, warm weather.

3. Plants 39-41 were sprayed inside greenhouse and then placed out-of-doors. A heavy rainstorm occurred during the first night of the experiment.

4. Plant No. 48 - sprayed with $NaClO_3$ 5:00 P.M. No sticker or spreader used.

Plant No. 49 - sprayed with $NaClO_3$ 11:30 A.M. No sticker or spreader used. Weather fine and warm with clear, cold nights after application.

Observations on Ribes After Chemical Treatment

1. Three days after $NaClO_3$ treatment. Plant No. 1 had several leaves begin to darken in spots. No other plants affected by chemicals.

2. Eight days after treatment. $NaClO_3$ and NH_4Cl began to turn leaves a brown color. No visible effects on stem-treated plants. $KBrO_3$, NaCl, and KBr exhibit no results of chemical's action.

3. Sixteen days after treatment. $NaClO_3$ had much greater effect on plants placed outside than on greenhouse plant. Plant in greenhouse which received no water less noticeably damaged than one receiving $\frac{1}{2}$ liter of distilled water per week. Plants treated with NH_4Cl did not show same differentiation between those given water and those kept without it. NH_4Cl showed very slight action on plant left outside. $KBrO_3$ had a slight effect on plant placed outside but none on greenhouse plant. KBr and NaCl - no observed effect.

4. Six days after treatment. The leaves of plant which had been left outside were quite brown, while leaves of greenhouse plant treated 22 days previous were merely spotted.

5. Twenty-one days after treatment. Plants which had been left in dark box were removed and examined. $NaClO_3$ had turned the leaves somewhat darker in color but no browning action had taken place. Action of NH_4Cl about same as that of $NaClO_3$. In absence of light, the chemical has an indifferent action.

Analysis of Treated Ribes

After a period of twenty-one days several samples of stem were cut from different parts of the Ribes plants. The stems were then cut into millimeter sections by means of a sharp razor and in the case of samples taken for analysis as shown in columns 2 and 3 of Table VIII, the layer of cortex was removed from the woody stem. Samples were then dried in a drying oven at a temperature of 85 to 90°C for a period of seven days. The material was ground in a small grinding machine and further reduced to a fine powder in a mortar. Samples were kept in tightly stoppered shell vials prior to analysis.

The halogen was then quantitatively determined according to the technique of P. L. Hibbard: Ind. Eng. Chem. Vol. 18, No. 8, page 826, August, 1926. The procedure which the writer followed included a

6. Plant No. 6 - sprayed with $MnSO_4$ 8:00 P.M. No moisture or chamber used.

Plant No. 60 - sprayed with $MnSO_4$ 11:30 A.M. No moisture or chamber used. Weather fair for rain with clear, cold nights after application.

Observations on Effect after Chemical Treatment

1. Three days after $MnSO_4$ treatment. Plant No. 1 had several leaves begin to darken in spots. No other plants affected by chemicals.

2. Eight days after treatment. Wilting and slight burns in many leaves a brown color. No visible effects on plant-treated plants. $KMnO_4$, $MnCl_2$, and CaF_2 consist no results of chemical's action.

3. Sixteen days after treatment. Wilting and burns greater effect on plants sloped others that on greenhouse plant. Plant in greenhouse which received no water late noticeably damaged than one receiving $\frac{1}{2}$ later of distilled water per week. Plants treated with $MgCl_2$ did not show same differentiation between given water and tap-water plants. $FeCl_3$ out it. $MnCl_2$ showed very slight action on plant left outside. CaF_2 had a slight effect on plant placed outside but none on greenhouse plant. $KMnO_4$ and $MnCl_2$ - no observed effect.

4. Six days after treatment. The leaves of plant which had been left outside were quite brown, while leaves of greenhouse plant treated - 80 days previous were nearly touched.

5. Twenty-one days after treatment. Plants which had been left in dark box were reduced to stems. $MnSO_4$ had burned the leaves somewhat darker in color but no interesting action had taken place. Action of $MnCl_2$ about same as that of $MnSO_4$. In absence of light, the chemical has no identifiable action.

Analysis of Treated Trees

After a period of twenty-one days several samples of each were cut from different parts of the Ribes plants. The stems were then put into alkaline solution by means of a short root in the [illegible] samples taken for analysis as shown in columns 3 and 4 of Table VIII. The layer of dried was removed from the woody stem. Samples were then dried in a drying oven at a temperature of 50 to 60°C for a period of seven days. The material was ground in a small grinding machine and further reduced to a fine powder in a mortar. Samples were kept in slightly stoppered shell vials prior to analysis.

The [illegible] was then quantitatively estimated according to the technique of L. Tinsley: Ind. Eng. Chem. Vol. 15, No. 8, page 834, August, 1923. The interpretation which the writer followed included a

few minor changes in amounts of reagents used in order to adapt the procedure to the use of larger amounts of organic material. A sample of prepared Ribes stem (0.07-0.09 gm.) is weighed on a clean watch glass and later removed to a 100 C.C. nickel crucible and the material moistened with a little water. 0.8 -1.0 gms. of Na_2O_2 is added and the lid placed on the crucible to prevent loss from effervescence. When the action has subsided, add a drop of alcohol and rinse the crucible lid and sides of the crucible. Warm gently on a steam bath until effervescence has ceased and then evaporate to dryness on a steam bath. Dry on a hot plate at 100° C. for about an hour. The mixture is then ignited at a low temperature. An electric muffle furnace is preferable but ignition over a low Bunsen flame may be substituted if it is very carefully done. The crucible should not be allowed to reach a dull, red heat. When the fusion is cool, dissolve in about 25 c.c. of distilled water and filter. If difficulty is experienced in filtering the strongly alkaline solution, neutralize a portion of the alkali by means of 5N-H_2SO_4 keeping the solution alkaline for this part of the procedure. Rinse the crucible carefully and wash the carbonized material. From 100 - 125 cc. of wash water is necessary to remove the last trace of halide from the remaining carbon. To the filtrate while still alkaline add (1-2) gms. Na_2HSO_3 to reduce any halogen which might have become oxidized during the ignition. Add a drop of methyl orange and run in 5N-H_2SO_4 until slightly acid. Place a convenient sized watch glass on the beaker and boil on a hot plate until the excess of SO_3 has been removed. Cool, make slightly alkaline and evaporate to a volume of 10 c.c. on a steam bath.

The sample, ready for analysis, is transferred to the chlorine or bromine apparatus as the case may be. For the chlorine analysis add 1 c.c. of saturated $KMnO_4$ solution and 1 c.c. 5N-H_2SO_4. The volume of the liquid for distillation should be 25-20 c.c. Heat on a Woods alloy bath and distill over the liquid at about 125° C. The liberated chlorine is titrated as it comes over by means of .01 N-$Na_2S_2O_3$. The liquid in the distilling flask should be evaporated to dryness in order to remove the last trace of chlorine. The number of c.c. of $Na_2S_2O_3$ used, multiplied by the factor 0.355 gives the number of milligrams of chlorine in the sample.

For the bromine analysis, transfer the liquid to the apparatus, keeping the volume as low as possible. 12-15 c.c. was found to be very satisfactory. Add 1 c.c. 5N-H_2SO_4 and 1 gm. of fresh chromium anhydride, CrO_3 for each c.c. of liquid contained in the tube. Connect at once to the absorber and titrate the liberated iodine as the bromine comes over. When no blue color appears after 3 to 4 minutes, the reaction may be considered as complete. The number of c.c. of .01 N-$Na_2S_2O_3$ used multiplied by the factor 0.8 gives the milligrams of bromine present in the sample.

a. Notes on Procedure.

1. It was found desirable to use a 10 c.c. standardized Mohr pipette instead of a 50 c.c. burette in the chlorine apparatus, since we were

measuring relatively small amounts of chlorine. A rubber connection with a small glass bead was found most satisfactory for these small measurements. A fine piece of wire arranged after the fashion of a peep sight and which could be moved over the length of the pipette was most useful in measuring small changes in the position of the meniscus. By using a hand lens, a difference of 1/100 of a c.c. could be fairly accurately determined.

2. A side filler on the Mohr pipette was found to be the most convenient method of filling the pipette.

3. $Na_2S_2O_3$ solution was made up by dissolving an accurately weighed portion of the C P crystal in distilled water that had been previously boiled and cooled out of contact with the air. The solution was then kept in 200 c.c. black enamelled storage bottles which connected directly with the Mohr pipette by means of a side tube. Air inlets on the storage bottle and Mohr pipette were protected by means of soda-lime tubes.

4. Fresh solutions of starch indicator, potassium iodide and sodium thiosulphate were made up twice a week.

b. Results of analyses.

The figures in the following tables are the average of two or more samples of Ribes stem:

Table VIII

Plants given water and kept under normal greenhouse light.

*Percentage of Halogen Found in Ribes Stems After Application of Spray to

Chemical Used and Concentration	Leaves, Upper & Lower Surface and Stems		Leaves, Upper Surface and Stems	Leaves, Upper Surface and Lower Surface.	Stems Only
	Bark	Woody Stem			
$NaClO_3$ - 20 %	5.42	1.11	1.89	0.643	1.46
NaCl - 10 %	4.62	1.49	1.79	0.739	1.37
NH_4Cl - 20 %	3.57	1.33	1.32	1.17	1.90
KBr - 5 %	2.00	Faint Trace	0.29	Trace	0.286
$KBrO_3$ - 3.1% (sat.)	0.712	None	0.145	Faint Trace	0.175

Control Plants - for chlorine - 0.622%
Control Plants - for bromine - None.

*Samples of Ribes stem were cut from the treated plants after 21 days. Stems were then cut into millimeter sections by means of a sharp razor and in the case of samples taken for columns 2 and 3 above, the layer of cortex was separated from the remainder of the stem. Samples were then dried for 7 days in a drying oven at temperature 85-90° C. Halogen content was then quantitatively determined. Technique of F.L.Hibbard; Ind. Eng. Chem. Vol. 18, No. 8, page 836, August, 1926.

Table IA

*Per Cent of Halogen in Ribes Stem After Application of Chemical To:

Chemical Used & Concentration	Leaves, Upper & Lower Surface and Stems	Stems Only
$NaClO_3$ - 20%	1.35	1.53
NaCl - 10%	2.39	1.69
NH_4Cl - 20%	2.49	2.12
KBr - 5%	0.67	0.27
$KBrO_3$ - 3.1%	0.08	0.15

Control Plants - Chlorine - 0.748
Control Plants - Bromine - None.

*The above plants received 1/2 liter of distilled water and were then placed in a dark box where they were kept until their subsequent sampling and analysis, 21 days later. Procedure was then as explained under Table I.

Table VIII

Effectiveness of Solvent Power in Lifting Effect Depending on Kind of Chemical Used in Different Concentration*

Chemical Used and Concentration	Leaves, Upper & Lower Surface and Stems		Leaves, Upper & Lower Surface and Stems Only	Stems Only
	Dark	Light		
$FeCl_3$ - 2%	0.46	1.87	1.89	1.46
$FeCl_3$ - 1%	0.69	1.60	1.78	1.87
$MnCl_2$ - 2%	0.87	1.71	1.82	1.17
$KMnO_4$ - 2%	2.32	Leaves Dead	1.89	Alive
$(NH_4)_2Cr_2O_7$ - 2.5% (with 1%	0.72	Dead	1.46	Petals Trees

*Samples of alive stem were cut from the treated plants after 24 hrs. Stems were dyed red in alizarin reagents by means of a sharp razor and in the case of samples taken for columns 2 and 3 above, the layer of cortex was separated from the remainder of the stem. Samples were then dried for 7 days in a drying oven at temperature 85-90° C. Halogen content was then quantitatively determined. Experiments of P.I.Bibikova; Ind. Eng. Chem. Vol. 18, No. 8, page 826, August, 1926.

Table IX

Variation of Salt Ions in Ribbon Stem After Application of Chemical To:

Chemical Used & Concentration	Leaves, Upper & Lower Surface and Stems	Stems Only
$FeCl_3$ - 2%	1.89	1.46
$FeCl_3$ - 1%	1.78	1.87
$MnCl_2$ - 2%	1.82	1.17
$KMnO_4$ - 2%	Leaves Dead	Alive
$(NH_4)_2Cr_2O_7$ - 2.5% (with 1%	Dead	Petals Trees

Control Plants - Halogen - 1.86%
Control Plants - Dry Moisture - None.

*The above plants received 1/2 liter of distilled water and were then placed in a dark box where they were kept until their subsequent weighing and analysis, 21 days later. Procedure was then as explained under Table I.

Table X

Plants Kept Without Water Under Normal Greenhouse Light

* Per cent of Halogen in Ribes Stem After Application of Chemical to:	
Chemical Used and Concentration	Leaves, upper and Lower Surface and Stems
$NaClO_3$ - 20%	1.64
NaCl - 10%	2.30
NH_4Cl - 20%	2.53
KBr - 5%	0.26
$KBrO_3$ - 3.1%	0.04

Control Plants -- Chlorine - 0.823%
Control Plants -- Bromine - None

*The above plants received no water after application of the chemical and were placed under normal conditions of greenhouse light and moisture. Sampled and analyzed as previously stated.

Table XI

Plants Placed Outside Under Normal Conditions of Sunlight and Moisture.

*Per cent of Halogen in Ribes Stem After Application of Chemical to:		
Chemical Used and Concentration	Leaves, Upper and Lower Surface and Stems	
	Woody Stem	Bark
$NaClO_3$ - 20%	0.962	1.50
NH_4Cl - 20%	0.77	
$KBrO_3$ -3.1%	0.06	

Control Plants -- Chlorine - 0.624%
Control Plants -- Bromine - None.

*The above plants were sprayed and then placed outside and left under the normal conditions of moisture and full sunlight for a period of 21 days. Sampled and analyzed as previously stated.

Table XII

Halogen Content of the Ash of Ribes Plants Placed Under Different Conditions of Light and Moisture.

Conditions	% Chlorine	% Bromine
1. Pots filled up with tap water two and three times each week. Full greenhouse light.	0.622	None
2. Plants given ½ liter of distilled water per week. Full greenhouse light.	0.648	None
3. Plants left in the full sunlight of outdoors and normal moisture as provided by varying weather.	0.624	None
4. Plants placed in a dark box and kept without water.	0.748	None
5. Plants kept without water. Full greenhouse light	0.823	None

Table XIII

Halogen Content of Ribes Stem After Immersion in Solutions of Halide and Oxy-halogen Compounds.

Chemical Used and Concentration	% Halogen Present After Treatment of Live Stem	% Halogen Present After Treatment of Dead Stem
$NaClO_3$ - 25%	7.90	7.76
$NaClO_3$ -3.1%	3.19	--
NaCl - 10%	8.14	--
NH_4Cl - 20%	13.02	10.28
$KBrO_3$ -3.1%	1.09	0.70
KBr - 20%	15.29	9.95
KBr -3.1%	4.92	--

Above samples of live and dead Ribes stem were cut from greenhouse plants, sectioned into millimeter sections by means of a sharp razor. The prepared samples were then immersed in the above solutions for 24 hours, dried on filter paper before placing in a drying oven at 85 to 90 degrees Centigrade for seven days. After grinding and powdering 0.5-0.1 gram samples were taken and the Halogen content determined according to the method previously mentioned.

Table XIII - A

No. of Root Sample	Chemical Used in Treatment	Manner of Application of Chemical	Conditions under which plants were kept.	Per cent Chlorine Found
1R.	$NaClO_3$	Leaves, Upper and Lower Surface and Stems	1/2 liter distilled H_2O per week. Normal greenhouse light.	1.20
37R.	Control	"	"	0.85
10R.	NaCl	"	"	1.04
13R.	NH_4Cl	"	"	0.80
21R.	$NaClO_3$	"	No water after app. of chemical. Kept in dark box. Normal greenhouse light.	1.05
36R.	Control	"	"	0.74
31R.	$NaClO_3$	"	No water. Normal greenhouse light.	0.87
38R.	Control	"	"	1.00
42R.	Control	"	Placed outside under normal light and moisture.	1.03
47R.*	Control	"	"	1.03
43R.*	$NaClO_3$	"	"	0.94
48R.	$NaClO_3$	"	"	0.74
49R.	$NaClO_3$	"	"	0.85

*Cultivated Black Currants.
Remainder Cultivated Red Currants as in Stem experiments.

Table XIV

Condition	Chemicals Compared	Difference in %
I	$NaClO_3$ - NH_4Cl	+0.57
II	" "	-1.14
III	" "	-0.89
I	$KBrO_3$ - KBr	-0.145
II	" "	-0.59
III	" "	-0.22
I	$NaClO_3$ - NaCl	+0.10
II	" "	-0.93
III	" "	-0.66

Note: Condition I = + M + L = Moisture and light.
" II = - M - L = No moisture and no light.
" III = - M + L = No moisture and light.

Table XV

Per Cent Nitrogen in Ribes Tissue

Series No.	$NaClO_3$	NaCl	NH_4Cl	$KBrO_3$	KBr
I + M + L	1.89	1.79	1.32	0.145	0.29
II - M - L	1.35	2.28	2.49	0.08	0.67
III - M - L	1.64	2.30	2.53	0.04	0.26

Table XVI

Same as Table XV--Less Control Factor

Series No.	$NaClO_3$	NaCl	NH_4Cl	$KBrO_3$	KBr
I + M +L	1.27	1.17	0.70	0.145	0.29
II - M - L	0.60	1.53	1.74	0.08	0.67
III - M + L	0.82	1.48	1.71	0.04	0.26

Discussion of Results

Although the data show a slight increase in the chlorine content of the woody stem of sprayed Ribes over that of the untreated plants, the difference is of the same order of magnitude as the amount of chlorine originally found present. Examination of the chlorine content of our controls, which were placed under different conditions of light and moisture indicates that Ribes are able to concentrate in their tissue different amounts of chlorine, depending upon the external factors of moisture and sunlight. The observed increase in chlorine content of the woody stem is consequently not indicative of absorption having taken place through the leaves and stems. It is quite possible the bromine analysis in the case of the cambium and woody stem after potassium bromate treatment failed on account of the small concentration of bromate ion which might have been masked by the much larger amount of chlorine present. In the analysis of the entire stem, the presence of bromine in Ribes tissue after treatment with the bromide and bromate is comparable with that of the chlorine found, if we take into consideration the smaller concentration of bromide and bromate used.

No consistent relationships are shown by comparison of the data obtained on analysis of plants where the different chemicals were applied to leaves and stem, leaves alone, stem alone (See Table VIII). The order of magnitude of any difference is obviously small. However, if we arrange the data of any one method of treatment (stems and leaves upper and lower surface) as it is done in Tables XIV, XV, XVI, several interesting points suggest themselves.

The difference between the amount of halogen found present in the Ribes tissue after treatment with $NaClO_3$ and NaCl respectively is greatest under conditions of optimum moisture and sunlight, the latter factor appearing as the more important of the two. Comparison of the bromate and bromide indicates that sunlight has the same limiting effect on the amount of the halogen present. Reference to Table XVI indicates that the chlorate and bromate alone follow this order of variance with changing conditions of moisture and sunlight. Although the smaller quantity of bromate determined renders the data prone to larger errors, it is interesting to note that the bromate acts similarly to the chlorate and we find that the bromate is also accumulated to the greatest extent under optimum light and moisture. Table XVI shows that the chloride and bromide content of Ribes tissue is greatest under conditions of minimum light and moisture. These data indicate that the chlorate and bromate are the only ones found in greatest concentration under maximum moisture and sunlight. In view of our field observations, which show sodium chlorate to be so much more effective than any of the other chemicals, this may be a significant fact.

Data from root analyses of treated plants do not indicate any absorption of the halogen into the root parts of the plant. In some cases values for the controls are higher than those of treated plants. The

Discussion of Data.

Although the data show a slight increase in the chlorine content of the woody stem of sprayed Ribes over that of the untreated plants, the difference is of the same order of magnitude as the amount of chlorine originally found present. [illegible] the chlorine content of our controls, which were placed under different conditions of light and moisture indicates that Ribes are able to concentrate in their tissue different amounts of chlorine, depending upon the external factors of moisture and sunlight. The observed increase in chlorine content of the woody stem is consequently not indicative of absorption having taken place through the leaves and stems. It is quite possible the bromine analysis in the case of the camphor and woody stem after potassium bromate treatment failed on account of the small concentration of bromate ion which might have been masked by the much larger amount of chlorine present. In the analysis of the entire stem, the presence of Bromine in Ribes tissue after treatment with the bromide and bromate is comparable with that of the chlorine found, if we take into consideration the smaller concentration of bromide and bromate used.

No consistent relationships are shown by comparison of the data obtained on analysis of plants where the different chemicals were applied to leaves and stem, leaves alone, stem alone (See Table VIII). The order of magnitude of any difference is [illegible]. However, if we arrange the data of any one method of treatment (stems and leaves upper and lower surface) as it is done in Tables XIV, XV, XVI, several interesting points suggest themselves.

The difference between the amount of halogen found present in the Ribes tissue after treatment with NaClO3 and NaCl respectively is greatest under conditions of optimum moisture and sunlight, the latter factor appearing as the more important of the two. Comparison of the bromate and bromide indicates that sunlight has the same limiting effect on the amount of the halogen present. Reference to Table XVI indicates that the chlorate and bromate alone follow this order of variance with changing conditions of moisture and sunlight. Although the smaller quantity of bromate determined renders the data prone to larger errors, it is interesting to note that the bromate acts similarly to the chlorate and we find that the bromate is also accumulated to the greatest extent under optimum light and moisture. Table XVI shows that the chloride and bromide content of Ribes tissue is greatest under conditions of minimum light and moisture. These data indicate that the chlorate and bromate are the only ones found in greatest concentration under maximum moisture and sunlight. In view of our field observations, which show sodium chlorate to be so much more effective than any of the other chemicals, this may be a significant fact.

Data from root analyses of treated plants do not indicate any absorption of the halogen into the root parts of the plant. In some cases values for the controls are higher than those of treated plants. The

highest value for chlorine is again given by roots of plants treated with chlorate and kept under optimum moisture and full greenhouse light.

Summary

1. The amount of halogen present in Ribes tissue after treatment with sodium chlorate is greatest under optimum conditions of moisture and light. This also holds good for the potassium bromate, but we find that the halogen from sodium and ammonium chloride and potassium bromide treatment, is present in greatest amounts when the plants are kept under minimum light and moisture.

2. Absorption, if any, is small in magnitude and probably local in nature when the above chemicals are applied to the aerial parts of Ribes.

3. No increase is observed in the halogen content of the roots after application of the chemical to the aerial parts of plants.

4. Action of chlorate is much faster on Ribes placed in full sunlight than on greenhouse plants where a partial exclusion of the ultraviolet end of the spectrum occurs.

5. Action of chlorate is much faster on greenhouse plants receiving 1/2 liter of distilled water per week than on greenhouse plants which received no water after application of the chemical.

6. Action is more rapid in the case where chlorate is applied to the lower leaf-surface than when it is applied to the upper surface.

7. No visible effects two weeks after chlorate is applied to the stems alone.

8. Applied to the leaves alone, the action is apparently the same as in the case of application to the stems and leaves.

9. Plants treated with chlorate and placed in a dark box, with no water after application of the chemical showed comparatively little browning of the leaves.

10. Results to date suggest that the toxic action of sodium chlorate is due to a slow change of the chlorate over to the perchlorate form under the actinic influence of the sun with the liberation of nascent oxygen. Nascent oxygen can either diffuse through lenticels and stomata and act directly on the living cells or by virtue of its powerful oxidizing action, break down the cutinized material itself until diasmosis can take place freely through the oxidized cuticle. The entire plant is killed to the ground in this manner and the roots and crown die due to starvation and winter kill.

Tuesday

This suggested explanation opens up a very interesting field of investigative work. It appears to the writer that those compounds which are able to liberate a gaseous constituent under field conditions would create a highly toxic medium for Ribes and this field of possible Ribes killers is being carefully investigated.

In the Idaho white pine region a type commonly occurs which we refer to as "swamp." In these areas, R. petiolare and R. inermis grow in very heavy concentration intermingled with Salix, Alnus, Crataegus and other brush. White pine stands ranging from 25% to 90% are within easy striking distance on the adjacent hillsides, and the nature of the type is such that the damp, moist conditions under which R. petiolare and R. inermis grow, lend themselves to an optimum production and spread of sporidia. Experimental tests show that R. petiolare, possibly next to R. nigrum, is most prolific in the formation of these sporidia. Consequently, from the standpoint of local control, it is necessary to eradicate these areas, and to eradicate them by the most effective and cheapest method.

Experimental work conducted by chemical eradication crews during the years 1925, 1926, 1927 shows that these highly concentrated areas can be more cheaply eradicated by chemicals than by hand. No figures are available on the efficiency of hand pulling this type, but the writer speaks from actual experience when he says that the roots and crowns of large clumps of R. petiolare are extremely difficult, if not impossible to eradicate by hand. When we find R. petiolare in soft, marshy locations, with its roots in many cases under water, and R. inermis intermingled with extremely thick brush, it is easy to appreciate the difficulties of hand pulling. The actual physical labor involved in the use of chemical equipment, is also considerably less than that of hand eradication. This is a very important factor, when one takes into consideration the morale of a crew that is bound to suffer when working over an area of this kind, presenting as it does such adverse working conditions.

It should be observed that Section II of this report covers the field activities which started in eastern California, May 1st and which ended with our field work in Idaho, September 10th. Research work at Berkeley during the winter 1926 and 1927 is fully covered in the first section of the report, and reference to this work should be made in order to understand clearly the course followed by subsequent field experiments.

Early in the year it was decided to keep separate our application studies and our search for new Ribes killers. With this idea in mind the following general working plan was adopted:

1. Rechecking of 1926 work and data taking over the areas worked

Section II

REPORT ON THE PROGRESS OF CHEMICAL ERADICATION IN THE WEST

By
H. R. Offord
Agent

I. Introduction

In the Idaho white pine region a type commonly occurs which we refer to as "swamp." In these areas, R. petiolare and G. inermis grow in very heavy concentration intermingled with Salix, Alnus, Crataegus and other brush. White pine stands ranging from 25% to 80% are within easy striking distance on the adjacent hillsides, and the nature of the type is such that the damp, moist conditions under which R. petiolare and G. inermis grow, lend themselves to an optimum production and spread of sporidia. Experimental tests show that R. petiolare, possibly next to R. nigrum, is most prolific in the formation of these sporidia. Consequently, from the standpoint of local control, it is necessary to eradicate these areas, and to eradicate them by the most effective and cheapest method.

Experimental work conducted by chemical eradication crews during the years 1925, 1926, 1927 shows that these highly concentrated areas can be more cheaply eradicated by chemicals than by hand. No figures are available on the efficiency of hand pulling this type, but the writer speaks from actual experience when he says that the roots and crowns of large clumps of R. petiolare are extremely difficult, if not impossible to eradicate by hand. When we find R. petiolare in soft, marshy locations, with its roots in many cases under water, and G. inermis intermingled with extremely thick brush, it is easy to appreciate the difficulties of hand pulling. The actual physical labor involved in the use of chemical equipment, is also considerably less than that of hand eradication. This is a very important factor, when one takes into consideration the morale of a crew that is bound to suffer when working over an area of this kind, presenting as it does such adverse working conditions.

It should be observed that Section II of this report covers the field activities which started in eastern California, May 1st and which ended with our field work in Idaho, September 10th. Research work at Berkeley during the winter 1926 and 1927 is fully covered in the first section of the report, and reference to this work should be made in order to understand clearly the course followed by subsequent field experiments.

Early in the year it was decided to keep separate our application studies and our search for new Ribes killers. With this idea in mind the following general working plan was adopted:

1. Rechecking of 1926 work and data taking over the areas worked

last year.

2. Further experimental work with new killing agents in California, and Idaho.

3. Experimental application studies.

a. Eradication of a large area of swamp type using knapsack sprayers and $NaClO_3$ as the killing agent.

b. Testing of power equipment over a relatively large area.

The services of one man in California and one man in Idaho were procured for chemical experimental work and a crew of six men was hired to carry out the large scale spraying operation.

II. (1). Wallace, Idaho - June 2 to 5

The writer, together with L. I. Legrid, commenced work on the Wallace plots June 2. Data were carefully taken to ascertain particularly the condition of R. petiolare the second year after spraying. Results were very encouraging. Only an occasional sprout was found and in most cases it was a difficult task to locate the old roots and crowns. Most of the dead aerial stems had broken off at the surface of the ground and had been washed away by the early season stream floods. No spraying was done at Wallace this year. Data on last year's spraying were also taken.

last year.

Table No. 1

Ribes Data - Wallace Plots

Sprayed June, 1926--Data Taken June, 1927

Plot Number	Species	Chemical Used	Concentration	How Applied	Feet of Live Stem 1927	Feet of Dead Stem 1927	Per cent Kill 1927
I(3.5-3.6)A	R.pet.	$KClO_3$ NaOH	6% 2%	Spray	1 Clump 15'x5'. East of cedar tree.		75 estimated
"	"	$KClO_3$	6%	"	1 Clump 20'x 5'. West of cedar tree.		98 "
I(4-5)A	"	"	"	"	3 large clumps.		93 "
"	R.lac.	"	"	"	2 " "		67 "
II(0-1)A	R.pet.	$KClO_3$	"	"	1 " clump.		99 "
II(1-2)A	"	"	"	"	2 " clumps.		95 "
III(0-1)A	"	NaOH	5%	"	310	300	48.8
"	R.lac.	"	"	"	62	31	33.3
III(1-2)A	R.pet.	"	"	"	2,305	1,202	34.7
"	R.lac.	"	"	"	537	185	25.6

Table No. 2

Recheck of Wallace Plots Sprayed 1925

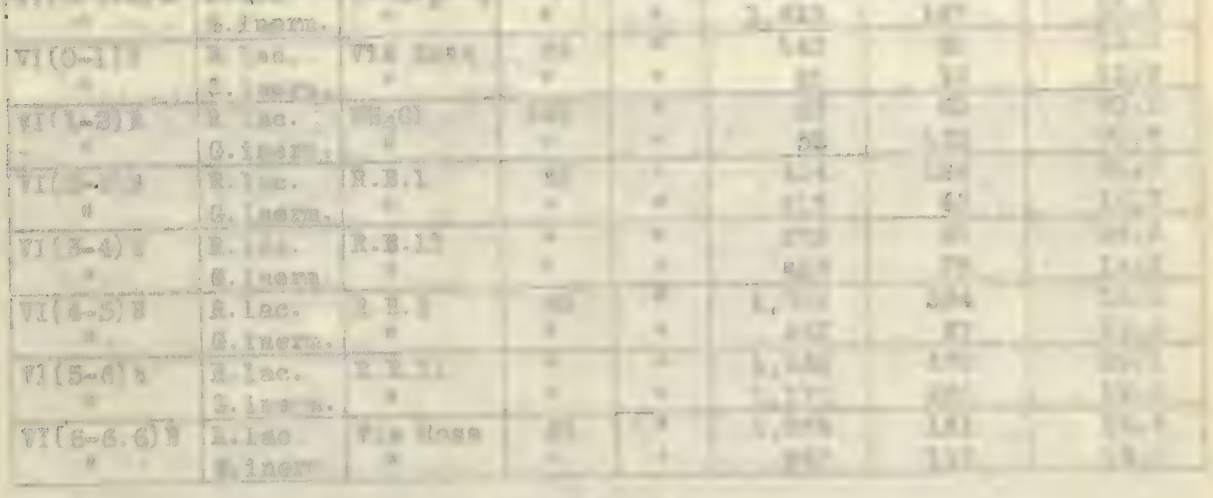
I(0-4)B	R.pet.	$NaClO_3$	50%	Spray	214	1,131	84.0
"	R.lac.	"	"	"	170	1,006	68.9
II(0-6.6)B	R.pet.	"	25%	"	27	4,440	99.6
"	R.lac.	"	"	"	260	1,031	79.7
I(5-6.6)A	R.pet.	"	"	"	4	489	99.3
"	R.lac.	"	"	"	107	90	42.8
I(0-3.5)A	R.pet.	NaF	5%	"	7,400	981	11.7
"	R.lac.	"	"	"	956	529	35.6

Discussion - One very interesting point arises from the results of 1926 spraying. Note that the strongly alkaline solution of $KClO_3$ is not nearly so effective as the $KClO_3$ alone. This suggests the very interesting problem of the part played by hydrogen and hydroxyl ions.

A recheck of the plots sprayed in 1925 with $NaClO_3$ - 25% showed a kill of 99.4% average. Bushes were completely dead and roots were decayed. The 25% solution was noticeably more active than the 50%.

II.(2) Santa, Idaho - June 6 - 30

Rechecking of the 1926 plots was started by L. I. Legrid and the writer on June 6th. Data were taken on the scheme worked out in previous years and included height of bush, feet of live stem, feet of dead stem and general notes on the condition of the Ribes. These data were taken for each Ribes species present on the ground. For the most part data were taken and recorded by one man. Since the boundaries of the plots were definitely marked, one man could readily work alone by working a scheme of string markers. Two string lines, laid across the 33 feet of a section at distances of 3 feet to 6 feet, depending upon the concentration of Ribes, enabled one to keep careful count of all Ribes. Data are summarized in Table No. 3.





Discussion - One very interesting point arises from the results of this study. Note that the atomic ratio of Li/Ti is 1a with nearly as effective as the $LiCl_3$ alone. This suggests the very important problem of the part played by hydrogen and hydroxyl ions.

A replica of the floor erected in 1935 with $MnClO_3$ - 35% showed a kill of 99.4% styrex. Timbers were completely free and roots were damaged. The 35% solution was relatively more toxic than the 3%.

IX-(3) Insecticidal Tests - Phase 2 - CC

Beginning of the 1936 field was started by L. L. Lovell and the writer on June 15th. Data were taken on the volume weight of 12 previous years and included height of trunk, feet of live wood, feet of dead wood and general notes on the condition of the trees. These data were taken for each kiln about ready to be fired. For the most part data were taken and recorded by one man. Since the operation of the kilns were identically carried, one man could readily work alone by working a series of spring workers. Two wiring lines, laid across the 25 feet of a course at distance of 2 feet to a post, permanently mark the concentration of kilns, enabled one to keep records about 12 kilns. Data are summarized in Table No. X.

Table No. 3

Ribes Data - Santa Plots
Sprayed July, 1926 -- Data Taken June, 1927

Plot Number	Species	Chemical Used	Concentration	How Applied	Ft. of Live Stem 1927	Ft. of Dead Stem 1927	Per cent Kill 1927
VI(0-1)A	R.lac.	R.B.1	8%	Spray	177	33	15.7
"	G.inerm.	"	"	"	141	21	12.9
VI(1-2)A	R.lac.	NH_4F	4%	"	119	61	33.9
"	G.inerm.	"	"	"	117	70	37.4
VI(2-3)A	R.lac.	NH_4Cl	25%	"	518	1,931	78.7
"	G.inerm.	"	"	"	271	706	72.3
VI(3-4)A	R.lac.	$(NH_4)_2CO_3$	20%	"	717	271	27.4
"	G.inerm.	"	"	"	559	96	14.6
VI(4-5)A	R.lac.	"	15%	"	760	269	26.3
"	G.inerm.	"	"	"	478	69	12.6
VI(5-6)A	R.lac.	NH_4F	10%	"	422	1,268	74.8
"	G.inerm.	"	"	"	542	930	63.2
VI(6-6.6)A	R.lac.	$(NH_4)_2CO_3$	20%	"	1,160	299	20.5
"	G.inerm.	"	"	"	1,410	167	10.6
VI(0-1)B	R.lac.	Via Rasa	8%	"	143	20	12.3
"	G.inerm.	"	"	"	81	12	12.9
VI(1-2)B	R.lac.	NH_4Cl	25%	"	23	55	70.3
"	G.inerm.	"	"	"	55	132	70.7
VI(2-3)B	R.lac.	R.B.1	8%	"	454	126	21.7
"	G.inerm.	"	"	"	215	43	16.7
VI(3-4)B	R.lac.	R.B.11	"	"	273	89	24.6
"	G.inerm.	"	"	"	453	75	14.2
VI(4-5)B	R.lac.	R.B.1	4%	"	1,002	224	18.1
"	G.inerm.	"	"	"	442	87	16.4
VI(5-6)B	R.lac.	R.B.11	"	"	1,862	470	20.1
"	G.inerm.	"	"	"	1,175	285	19.5
VI(6-6.6)B	R.lac.	Via Rasa	6%	"	1,034	191	15.6
"	G.inerm.	"	"	"	847	117	12.3

Table No. 4

X - V	R.lac.	$NaClO_3$	2%	Spray	30	10	25
"	R.pet.	"	"	"	45	1,382	97
X - VIII	R.lac.	NH_4F	5%	"	4	0	0
"	G.inerm	"	"	"	1,127	153	11.9
X - IV	R.lac.	R.B.11	8%	"	501	52	9.4

Table No. 5

Santa Plots

Comparative Results of One or More Applications of One Chemical

Plot Number	Species	Chemical Used	Concentration	How Applied	Times Applied	% Kill 1926	% Kill 1927
I(1-2)A	R.lac.	NaOH	4%	Spray	3	37.8	40.7
"	G.inerm.	"	"	"	3	30.1	39.1
I(2-3)A	R.lac.	"	"	"	2	76	25.3
"	G.inerm.	"	"	"	2	42	32.3
I(0-1)B	R.lac.	$NaClO_3$	25%	"	2	82.7	92.5
"	G.inerm.	"	"	"	2	62.7	91.2
III(2-3)B	G.inerm.	"	"	"	2	42.7	47.2
I(2-3)B	R.lac.	"	18%	"	2	69.1	88.7
"	G.inerm.	"	"	"	2	37.8	57.7
III(0-1)B	R.lac.	"	10%	"	2	62.6	92.7
"	G.inerm.	"	"	"	2	29.5	46.6
II(4-5)A	R.lac.	NH_4Cl	12½%	"	2	30.9	62.2
"	G.inerm.	"	"	"	2	23.8	52.5
III(0-1.5)A	G.inerm.	"	20%	"	2	39.1	32.4
III(2-3)A	G.inerm.	Lvs.strpd. by hand	--	--	2	2.0	34.9
V(0-1)B	R.lac.	$NaClO_3$	10%	Cr. App.	1	50	64.2
"	G.inerm.	"	"	"	1	13.2	54.8
II(6-6.6)B	R.lac.	"	50%	"	1	100	65.0
"	G.inerm.	"		"	1	66.6	63.8
II(0-1)B	R.lac.	NaOH	4%	Spray + Soil App.	1	29.0	42.0
II(0-1)B	G.inerm.	"	"	"	1	21.6	29.8

Discussion. Results of 1926 tests of new chemicals on Santa plots do not bring to consideration a more efficient Ribes killer than $NaClO_3$. Ammonium chloride, saturated solution, is probably more effective on G. inermis than $NaClO_3$ in the matter of suppression of live stem. The number of complete kills, however, is less. German weed killers, R.B.I, R.B.II, and Via Rasa were not favorable.

A study of data on plots to which NaOH had been applied two and three times does not indicate that successful methods can be developed by means of a cheap defoliator. Chemical defoliation closely approximates in its action on the bushes, defoliation by hand stripping.

Table No. 4

Water Tests

Comparative Results of One or More Treatments of Five Observed

Plot Number	Details	Checked Test	Number Applied	Date Applied	Number Applied	Mean Result
I(A-3)A	0.1 tre.	Mn(II)	24	Every	5	87.5
"	0.1 tre.	"	"	"	5	87.5
I(A-3)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
I(C-1)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
II(A-4)A	0.1 tre.	"	"	"	5	87.5
II(B-3)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
III(C-1)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
II(B-3)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
III(C-1.5)A	0.1 tre.	"	"	"	5	87.5
III(B-3)A	0.1 tre.	"	"	"	5	87.5
A(C-1)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
II(C-2.5)A	0.1 tre.	"	"	"	5	87.5
"	0.1 tre.	"	"	"	5	87.5
I(C-1)A	0.1 tre.	"	"	"	5	87.5
II(C-1)A	0.1 tre.	"	"	"	5	87.5

Discussion. Results of 1926 tests of new chemicals on Banks cloths do not bring to consideration a more efficient Mn(II) filter than MnO_2. Permutit, a synthetic, saturated solution, is probably more effective on S_2 bearing than MnO_2 in the matter of suppression of live steam. The number of complete mills, however, is less. German wood mills, M.M.I, M.M.II, and Via Mana were not favorable.

A study of data on plots to which MnO4 had been applied two and three times does not indicate that successful methods can be identified by means of a Permutit deferrizator. Chemical purification closely approximates in its action on the bushes. Purification by hand strip-



W.678. Santa, Idaho G. inermis shows sprouting from the crown. 100% kill of original L.S. by means of $NaClO_3$.



W.695. Clarkia, Ida. White cards indicate A. petiolare seedlings. Germination took place after protecting overstory had been killed with $NaClO_3$.

II. (3) Clarkia, Idaho - June 16 -23

A crew of six men commenced work June 16 over the areas sprayed last year. Ribes data were taken and respraying done on Blocks III, V, and VI. Part of Block III was left unsprayed this year, and half of this section will be sprayed next year. We shall then have comparative experiments on the results of respraying areas in succeeding and alternate years. Table No. 6 compares 1926 and 1927 work.

Table No. 6

Block No.	Chemical Used 1926	Chemical Used 1927	Gals. Spray per A. 1926	Gals. Spray per A. 1927	Man sp.hrs. per A. 1926	Man sp.hrs. per A. 1927	Per cent Initial Cost in 1927	
							Labor	Chemical
III	$NaClO_3$ - 25%	$NaClO_3$ - 25%	110	28.2	22.26	11.2	50.4	35.6
V	$NaClO_3$ - 25% + $CaCl_2$ - 6½%	" "	73.3	54.5	12.13	9.2	75.8	75.2
VI	$NaClO_3$ - 25% + $CaCl_2$ - 6½%	" "	67.8	30.2	12.81	8.7	67.9	44.5

In analyzing the data in the above table it is interesting to refer to the following figures which give the efficiency on the different species on these areas:

Table No. 7

Block No.	Species	% Kill 1927	Average Kill	Remarks
III	R.petiolare	96.5		Sprayed in early August.
"	R.lacustre	57.1	64.4	$NaClO_3$ alone - weather
"	G.inermis	39.8		clear and warm.
V	R.petiolare	32.8		Sprayed end of August.
"	R.lacustre	11.7	24.2	$CaCl_2$ added to spray.
"	G.inermis	28.1		Weather very unsettled with rain.
VI	R.petiolare	79.2		As above - only
"	R.lacustre	22.2	42.2	weather clear for most
"	G.inermis	25.2		part.

Last year costs on Block III ran: Chemical, $21.40; labor, $16.47--Total, $37.87. For the respraying work, applying percentages of Table No. 7 we have: Chemical, $5.35; labor, $8.30--Total $13.65.

II. (3) Clarkia, Idaho - June 16 -25

A crew of six men commenced work June 16 over the areas sprayed last year. Notes data were taken and tespraying done on Blocks III, V, and VI. Part of Block III was left unsprayed this year, and half of this section will be sprayed next year. We shall then have comparative experiments on the results of respraying areas in succeeding and alternate years. Table No. 6 compares 1926 and 1927 work.

Table No. 6

Block No.	Treatment 1926	Chemical Used 1926 & 1927	Gals. Spray per A. 1926	Man hrs. per A. 1927	Man hrs. per A. 1926	Per cent Initial Cost in 1927 Labor	Chemical
III	$MnCl_2$ - 4# $CaCl_2$ - 4#	$MnCl_2$ - 4# $CaCl_2$ - 4#	110	28.2	22.26	11.2	30.4	26.6
V	$MnCl_2$ - 4# $CaCl_2$ - 4# Oil - 6%	" "	75.5	34.8	12.13	9.2	76.8	73.2
VI	$MnCl_2$ - 4# $CaCl_2$ - 4# Oil - 6%	" "	67.8	30.2	12.81	8.7	67.9	64.5

In analyzing the data in the above table it is interesting to refer to the following figures which give the efficiency on the different species on these areas:

Table No. 7

Block No.	Species	Per cent Kill 1927	Average Kill	Remarks
III	1. Ponderosa	92.2	64.4	Sprayed in early August. $MnCl_2$ alone - weather clear and warm.
"	2. Jeffreys	87.1		
"	3. Douglas	73.9		
V	1. Ponderosa	73.8	74.3	Sprayed end of August. $CaCl_2$ added to spray. Weather very unsettled with rain.
"	2. Jeffreys	77.7		
"	3. Douglas	69.1		
VI	1. Ponderosa	74.3	42.2	No above - only weather clear for most part.
"	2. Jeffreys	47.6		
"	3. Douglas	38.3		

Last year costs on Block III ran: Chemical, $21.40; Labor, $16.47--Total, $37.87. For the respraying work, applying percentages of Table No. 7 we have: Chemical, $8.38; Labor, $8.30--Total $13.68.

The second spraying then costs us 25.5% of the original cost. It must be kept in mind that over 95% of this second cost on chemical should be charged against R. lacustre and G. inermis. Experiments performed at Clarkia in 1926 showed that it took about three times as long to actually spray the Ribes as it did to walk over the ground and find them. R. lacustre and G. inermis therefore are responsible for 75% of the labor involved in the second spraying. The cost of respraying the Clarkia area for R. petiolare according to the above estimate is $2.25 per acre.

Table No. 8

Ribes Data - Clarkia Plots
Sprayed in August 1926 - Data Taken June, 1927.

Block No.	Species	Chemical Used	Concentration	How Applied	Ft. of Live Stem 1927	Ft. of Dead Stem 1927	Per cent Kill 1927
I	R.petiolare	NH_4F	(4%	Spray	828	201	19.5
"	G.inermis	NH_4Cl	(20%	"	19,978	3,617	15.6
II	R.petiolare	$KClO_3$	4%	"	11,310	11,898	51.3
"	R.lacustre	"	"	"	492	35	6.6
"	G.inermis	"	"	"	29,596	5,109	14.7
III	R.petiolare	$NaClO_3$	25%	"	982	27,120	96.5
"	R.lacustre	"	"	"	539	717	57.1
"	G.inermis	"	"	"	3,635	2,389	39.8
V	R.petiolare	$NaClO_3$	(25%	"	2,343	1,142	32.8
"	R.lacustre	+	(	"	697	92	11.7
"	G.inermis	$CaCl_2$	(6%	"	6,165	2,410	28.1
VI	R.petiolare			"	3,438	13,045	79.2
"	R.lacustre	"	"	"	910	260	22.2
"	G.inermis			"	15,509	5,209	25.2
VII	R.petiolare			"	9,897	15,928	62.2
"	R.lacustre	"	"	"	746	198	20.9
"	G.inermis			"	13,646	5,601	29.1

Discussion. The best results have been obtained by the use of $NaClO_3$ - 25% and it is interesting to note the consistent figures of 1926 and 1927 work with this chemical:

Table No. 9

viz. -

Species	% Kill on Stem 1926	% Kill on Stem 1927
R.petiolare	96.3	96.5
R.lacustre	57.3	57.1
G.inermis	55.2	39.8

Table No. 4

Ribes Data - Clarvia Plots
Sprayed in August 1926 - Data Taken June, 1927.

Plot No.	Treated	Chemical Used	Concentration	Time Applied	Live Stem Count	Dead Stem Count	Per cent Dead
I	1. Sodium Arsenite	Blue Stone	(4%	Spray	408	247	12.0
"	2. Control		(ACK	"	19,979	3,017	13.4
II	1. Sodium Arsenite	"	4%	"	12,311	1,289	21.1
"	2. Lacrytus	"	"	"	486	28	6.4
"	3. Control	"	"	"	20,698	3,139	14.7
III	1. Sodium Arsenite	Blue Stone	3%	"	880	25,140	58.8
"	2. Lacrytus	"	"	"	1,240	717	57.1
"	3. Control	"	"	"	1,288	1,289	39.8
V	1. Sodium Arsenite	Blue Stone	4%	"	1,842	1,146	38.8
"	2. Lacrytus	"	"	"	897	89	11.7
"	3. Control	"	"	"	1,180	2,810	70.1
VI	1. Sodium Arsenite	"	"	"	1,280	12,245	74.1
"	2. Lacrytus	"	"	"	870	840	53.2
"	3. Control	"	"	"	12,819	8,277	39.8
VII	1. Sodium Arsenite	"	"	"	1,287	15,288	58.2
"	2. Lacrytus	"	"	"	748	189	21.2
"	3. Control	"	"	"	12,848	2,872	17.7

Discussion. The best results have been obtained by the use of Lacrytus - and yet it is interesting to note the consistent figures of 1926 and 1927 were with Blue Stone used.

Table No. 5

Plots	[illegible]	[illegible]
1. Sodium Arsenite	12.1	12.3
2. Lacrytus	27.4	27.1
3. Control	21.0	21.7



W.676. Clarkia, Idaho. R. petiolare in foreground 1 year after treatment with $NaClO_3$.



W.696. Clarkia, Idaho. Detail of killing procured by $NaClO_3$ sprayed on R. petiolare.

Blocks V, VI, and VII were sprayed much later in the year then Block III and $CaCl_2$ - 6½% was added to the spray formulae. Lower percentage of kill is doubtless explained partly by the lateness of the season and partly by the addition of $CaCl_2$. Considerable rain fell during the course of the work on Block V, and no doubt resulted in the loss of considerable chemical, which cut down the kill. The position of R. lacustre and G. inermis in our scale of susceptibility seems to be reversed by the addition of the calcium chloride.

III. (1) Experimental Chemical Work

California

Work was started in California this year for the first time, when the writer sprayed a few R. nevadense in the Stanislaus National Forest near Strawberry early in May. In late July an experimental program was instituted with the location of six permanent plots at Leland Meadow. An area of R. nevadense along the south fork of the Stanislaus just below the dam, was chemically eradicated. As a result of an unfortunate accident to R. P. d'Urbal, who was in charge of the California work, only a start was made on the program. Plots were laid out, data taken and a little spraying completed when the accident happened. However, sufficient spraying has been done to indicate that R. nevadense is rather susceptible to the action of chlorates. A check of 16 R. nevadense sprayed May 7 with $NaClO_3$ - 25% showed 100% kill of live stem in all instances, and only 3 bushes suckering from the crown.

In late September Mr. Benedict checked over the spraying done on R. nevadense along the south fork of the Stanislaus and reported as follows:

(1) New leaves on tips of the bushes in one or two instances.

(2) Crown sprouting from just below the surface of the ground, several cases.

(3) A few missed parts of bushes.

(4) A large percentage of what appears to be completely killed plants.

III. (2) Santa, Idaho

Experimental work for the season 1927 was done by L. I. Legrid with the assistance of the writer. Stations on Plots I to V, established in 1925, and which had not been affected by the chemical applied, were used for the new experiments. This saved considerable time since Ribes data had already been taken over those areas.

Blocks V, VI, and VII were sprayed much later in the year than Block III and CaCl$_2$ - 8# was added to the spray formula. Lower percentage of kill is doubtless explained partly by the lateness of the season and partly by the addition of CaCl$_2$. Considerable rain fell during the course of the work on Block V, and no doubt resulted in the loss of considerable chemical, which cut down the kill. The position of R. leucotrix and R. inermis in our scale of susceptibility seems to be reversed by the addition of the calcium chloride.

III. (I) Experimental Chemical Work

California

Work was started in California this year for the first time, when the writer sprayed a few R. navadense in the Stanislaus National Forest near Strawberry early in May. In late July an experimental program was instituted with the location of six permanent plots at Leland Meadow. An area of R. navadense along the south fork of the Stanislaus just below the dam, was chemically eradicated. As a result of an unfortunate accident to R. F. d'Urbal, who was in charge of the California work, only a start was made on the program. Plots were laid out, data taken and a little spraying completed when the accident happened. However, sufficient spraying has been done to indicate that R. navadense is rather susceptible to the action of chlorates. A check of 16 R. navadense sprayed May 7 with NaClO$_3$ - 8# showed 100% kill of live stem in all instances, and only 3 bushes sneering from the crown.

In late September Mr. Benedict checked over the spraying done on R. navadense along the south fork of the Stanislaus and reported as follows:

(1) Wow leaves on tips of the bushes in one or two instances.

(2) Crown sprouting from just below the surface of the ground, several cases.

(3) A few missed parts of bushes.

(4) A large percentage of what appears to be completely killed plants.

III. (I) [illegible]

Experimental work for the season 1927 was done by L. I. Legrid with the assistance of the writer. Stations on Plots I to V, established in 1926, and which had not been affected by the chemical applied, were used for the new experiments. This saved considerable time since fifteen days had already been taken over those areas.

Bushes were tagged with white cheesecloth and spraying was done with the three gallon compressed air type of hand sprayer. Stakes, lettered in red on a white background were placed at the northwest corner of each experimental station, following the general scheme used in previous years. Work at Santa covered the period July 1 to September 1.

Santa, Idaho

Legend for Following Spraying Data Sheets

1. Location data.
2. Number of each species.
3. Date, amount, and method of application.
   Cr. App. = crown application.
   sat. = saturated.
4. Chemical used and concentration
5. Soil temperature t_s and relative humidity h_r.
6. Weather

F = Fair	H = Hot
W = Warm	R = Rain
C = Clear	Cd = Cold
Cy = Cloudy	Wi = Wind
Cl = Cool	T = Thunder
sl = slightly	S = Smoky

7. Remarks

The defoliations marked 9/15/27 are my observations at that time. No frost to cause dropping of leaves had occurred up to that time.

P.B.B.

Santa, Idaho

1. Plot I A (1-2)
2. R. lacustre 56 -- G. inermis 262
3. 7/7/27 16 gals. spray.
4. NaCN 4%
5. t_s 57 h_r 39
6. F.W.C. Heavy dew, Cold nights.
7. Defoliation 100%
   Releaf 40%

1. Plot I A (5-6)
2. R. lacustre 43 -- G. inermis 183
3. 7/9/27 13 gals. spray.
4. $NaClO_3$ 25% NaCN 2%
5. t_s 59 h_r 42

Legend for Pollution Survey Data Sheets

1. Location data.
2. Number of each species.
3. Date, amount, and method of application.
   Cr. App. = crown application.
   mat. = material.
4. Chemical used and concentration
5. Soil temperature t_s and relative humidity h_r.
6. Weather
   T = rain
   W = hail
   D = sleet
   Sy = cloudy
   Cl = cool
   H = humidity
7. Remarks

6. F. W. C. heavy dew, cold nights.
7. Defoliation 100%
   Releaf 1% near base of stems.
   Some shoots coming up.
   Stems appear dead.

1. Plot I A (6-6.6)
2. R. lacustre 9 -- G. inermis 153
3. 7/8/27 10 gals. Spray.
4. $NaClO_3$ 25% CH_3COOH 2%
5. t_s 58 h_r 40
6. F.W.C. heavy dew, cold nights.
7. Defoliation 99+%
8. Releaf 2%. Shoots coming up.

1. Plot II A (0-1)
2. G. inermis 166
3. 7/11/27 11 gals. Spray.
4. $NaClO_3$ 25% HCl 2%
5. t_s 56 h_r 69
6. Cy. Cl. heavy dew, cool nights.
7. Defoliation 99%
8. Releaf 3%. Few shoots coming up.

1. Plot II A (2-3)
2. G. inermis 62
3. 7/5/27 14 gals. Spray.
4. NH_4NO_3 10% $KClO_3$ 5%
5. None given in report for 7/5/27.
6. F.W.C.
7. Defoliation 90%
8. Releaf 15%. Kill variable.

1. Plot II A (3-3.7)
2. R. lacustre 2 -- G. inermis 95
3. 7/14/27 9 gals. Spray.
4. $Al_2(SO_4)_3$ 25%
5. t_s 58 h_r 55
6. Cy. Cl. little dew, cool nights.
7. Defoliation 10%
8. Releaf 0%. Buds swelling.
9. Some branches completely dead.

1. Plot I & (E-E.F)
2. E. Ionization = -- E. Ionic Rad
3. Y1A/2Y Ib gals. Spec.
4. Fe(II) 3d6 CO5C00 2d
5. 4s 2p Br 4D
6. T.S.C. heavy den, cold nights.
7. Definition Obsg
   Select CH. Church coming up.

1. Plot II & (E-I)
2. E. Ionic Rad
3. Y1/IIY II gals. Spec.
4. Mn(I) 3d6 HCl 2d
5. Fe 4F Br 6D
6. CY. C. heavy den, cool nights.
7. Definition 3Pd2
   Select 2d Ben church coming up.

1. Plot II & (E-I)
2. E. Ionic Rad
3. Y1/IY II gals. Spec.
4. Mn(I) 3d6 HCl 2d
5. Fe 4F Br 6D
6. CY. C. heavy den, cool nights.
7. Definition 3Pd2
   Select 2d Ben church coming up.

1. Plot II & (E-I)
2. E. Ionic Rad
3. Y1/IY II gals. Spec.
4. Mn(I) 3d6 HCl 2d
5. Fe 4F Br 6D
6. CY. C. heavy den, cool nights.
7. Definition 3Pd2
   Select 2d Ben church coming up.

1. Plot II & (E-I)
2. E. Ionic Rad
3. Y1/IY II gals. Spec.
4. Mn(I) 3d6 HCl 2d
5. Fe 4F Br 6D
6. CY. C. heavy den, cool nights.
7. Definition 3Pd2
   Select 2d Ben church coming up.

Santa, Idaho

1. Plot II A (3.7-4)
2. R. lacustre 3 -- G. inermis 51
3. 7/14/27 2 gals. Spray.
4. K_2SO_4 sat.
5. t_s 58 h_r 55
6. Cy. Cl.
7. Defoliation 15% to 20%.
   Releaf 0%

1. Plot II B (0-0.5)
2. R. lacustre 1 -- G. inermis 64
3. 8/6/27 12 gals. Spray.
4. $NaClO_3$ 25%
5. t_s 57 h_r 48
6. F.W.C. cool nights, sl. smoky.
7. Defoliation 100%
   Releaf 15%

1. Plot II A (5-6.6)
2. R. lacustre 1 -- G. inermis 30
3. 7/16/27 2 gals. Spray.
4. $KMnO_4$ 15% HCl 3%
5. t_s 58 h_r 67
6. F.W.C. heavy dew, cold nights.
7. Defoliation 25%
   Defoliation 9/15/27 75%
   Releaf 2%, foliage turned black.

1. Plot II B (0.5-1)
2. R. lacustre 1 -- G. inermis 64
3. 8/6/27 12 gals. Spray.
4. $NaClO_3$ 25% Glue 0.1% as sticker.
5. t_s 57 h_r 48
6. F.W.C., Cl. night, sl. smoky.
7. Defoliation 98 - 100%
   Releaf 25%

1. Plot II B (1-1.5)
2. G. inermis 62
3. 8/6 and 8/27/27 7 gals. Spray.
4. $NaClO_3$ 25% Fish oil soap 1% as sticker
5. t_s 57 and 56 h_r 48 and 39

Plot 11 A (1-4)

1. Plot 11 A (1-4)
2. [illegible] -- [illegible]
3. [illegible] gals. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]

Plot 11 B (5-8)

1. Plot 11 B (5-8)
2. [illegible] -- [illegible]
3. [illegible] gals. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]

Plot 11 C (9-12)

1. Plot 11 C (9-12)
2. [illegible] -- [illegible]
3. [illegible] gals. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]

Plot 11 D (13-16)

1. Plot 11 D (13-16)
2. [illegible]
3. [illegible] gals. [illegible]
4. [illegible] Light oil soap 1% as sticker
5. [illegible] [illegible] 48 and 89

Santa, Idaho

6. F.W.C., H.
7. Defoliation 99 - 100%
Releaf 10%

1. Plot II B (1.5-2)
2. G. inermis 65
3. 8/8/ 27 and 12/27 7 gals. Spray.
4. $NaClO_3$ 25% Ca Caseinate 2% as sticker.
5. t_s 56 h_r 39 and 70
6. 8/8/27 F.W.C.H. 8/12 R.Cy.Cl.
7. Defoliation 100%
Releaf 0%. Stems still alive.

1. Plot II B (2-3)
2. R. lacustre 10 -- G. inermis 146
3. 7/7/ and 8/27 12 gals. Spray.
4. $KClO_3$ 4% CH_3COOH 2%
5. t_s 57 and 58 h_r 39 and 40
6. F.W.C.H. heavy dew, cold nights.
7. Defoliation 75%
Releaf 2%

1. Plot III A (2-3)
2. G. inermis 68 -- R. lacustre 2
3. 7/2 and 7/7 leaves stripped by hand.
4. None
5. t_s 57 h_r 49 and 39
6. F.W.C.
7. Defoliation 100%
Releaf 70%

1. Plot III A (4-4.2)
2. G. inermis 8
3. 7/18/27 2 gals. Spray.
4. $Na_2Cr_2O_7$ 50%
5. t_s 58 h_r 36
6. F.W.C. heavy dew, cool nights.
7. Defoliation 98%.
Releaf 10%. Old leaves and stems,
turned black. Many stems dead.

Parts Lists

6. T.C.C., P.
7. Defoliation 31 - 100%
Value: 10%

7. Plot 11 3 (1.5-.)
8. S. Imperia 85
1. 9/8/ 27 and 12/27 7 gals. Spray.
4. Build 100% Co Quaeinate 2% as stimulator.
8. 1a 6C 3y 29 and 70
5. 8/a/27 P.4.C.C. 8/12 S.Co.Cl.
7. Defoliation 100%
Value: Oil. Trees still alive.

1. Plot 11 3 (2-.)
2. S. Imperia 10 -- S. Imperia 10a
3. 7/27 and 8/27 12 gals. Spray.
4. Frosty at Chapman 25
5. 1a 8y and 8a 3y 8b and 4y
6. T.C.C. Heavy Spr., coal alpha.
7. Defoliation 75%
Value: 3d

1. Plot 11 4 (2-.)
2. S. Imperia 80 -- S. Imperia 4
3. 7/8 and 7/27 leaves affected by heat.
4. None
5. 1a 5y 3y 6a and 4y
6. T.C.C.
7. Defoliation 10%
Value: 75%

1. Plot III 1 (4-8.5)
2. S. Imperia 8
3. 7/18/27 2 gals. Spray.
4. Sept.-Oct 30%
5. 1a 6a 3y 4y
6. T.C.C. Heavy Spr., coal alpha.
7. Defoliation 20%.
Value: 10%. Is leaves but shows
burned still. Very shows rust.

Santa, Idaho

1. Plot III A (4.2-4.5)
2. R. lacustre 1 -- G. inermis 20
3. 7/18/27 2 gals. Spray.
4. $Na_2Cr_2O_7$ 25%
5. t_s 58 h_r 36
6. F.W.C. heavy dew, Cl. night.
7. Defoliation 98%
   Releaf 20%. Old leaves and stems turned black. Many stems dead.

1. Plot III A (4.5-5)
2. G. inermis 28
3. 7/19/27 2 gals. Spray.
4. $KMnO_4$ saturated.
5. t_s 58 h_r 34
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 25%
   Defoliation 9/15/27 50%
   Releaf 0%

1. Plot III A (5-5.7)
2. G. inermis 36
3. 7/15/27 3 gals. Spray.
4. $(NH_4)_2S_2O_8$ 25%
5. t_s 56 h_r 49
6. F.W.C. heavy dew, Cl. night.
7. Defoliation 100%
   Releaf 10%. Some plants nearly dead.

1. Plot III A (5.7-6)
2. G. inermis 32
3. 7/15/27 3 gals. Spray.
4. $(NH_4)_2S_2O_8$ 15%
5. t_s 56 h_r 49
6. F.W.C. heavy dew Cl. night.
7. Defoliation 75%
   Releaf 40%. Leaves healthy.

1. Plot III A (6-6.6)
2. G. inermis 9
3. 7/16/27 3 gals. Spray.
4. $Al_2(SO_4)_3$ 20%
5. t_s 58 h_r 67

Boise, Idaho

1. Plot III A (4.3-4.8)
2. [illegible] Immune I -- [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. F.W.C. heavy dew, Cl. night.
7. Defoliation 95%

Foliage [illegible]. Old leaves and stems
turned black. Many stems dead.

1. Plot III A (4.3-4.8)
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. F.W.C. heavy dew, Cl. night.
7. Defoliation [illegible]

Defoliation [illegible]

Foliage [illegible]

1. Plot III A (5-5.7)
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. F.W.C. heavy dew, Cl. night.
7. Defoliation [illegible]

Foliage [illegible]. Some plants nearly dead.

1. Plot III A (5.7-6)
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. F.W.C. heavy dew [illegible]. night.
7. [illegible]

[illegible]

1. Plot III A (5-5.6)
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

6. F.W.C. heavy dew, Cl. night
7. Defoliation 1% - 5%
8. Releaf 0%
4. $HClO_4$ 4%

1. Plot III B (3-3.65)
2. R. lacustre 1 -- G. inermis 39
3. 7/19/27 4 gal. Cr. App.
4. $KMnO_4$ sat.
5. t_s 58 h_r 34
6. F.W.C. light dew, Cl. night.
7. Defoliation 1% -5%
8. Releaf 0%
4. HCl
5. t_s 58 h_r 42

1. Plot III B (3.65-4)
2. R. lacustre 2 -- G. inermis 38
3. 7/19/27 4 gals. Cr. App.
4. K_2SO_4 sat.
5. t_s 58 h_r 34
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 1%-5%
8. Releaf 0%
4. CH_3COOH 6%
5. t_s 58 h_r 48

1. Plot III B (4-5)
2. R. lacustre 1 -- G. inermis 44
3. 7/19/27 5 gals. Spray.
4. $KMnO_4$ sat.
5. t_s 58 h_r 34
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 1%-5%.
   Defoliation 9/15/27 10 %
8. Releaf 0%

1. Plot III B (5-6)
2. G. inermis 72
3. 7/20 and 7/21/27 13 gals. Cr. App.
4. K_2SO_4 sat.
5. t_s 57 h_r 48 and 46
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 1%-5%
8. Releaf 0%
4. $NaClO_3$ 20% 400 ml
5. t_s 58 h_r 42
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 100%
   Releaf 10%. Stems still alive.

Santa, Idaho

1. Plot IV A (0-1)
2. G. inermis 41
3. 7/21/27 4 gals. Spray.
4. $HClO_4$ 4%
5. t_s 57 h_r 46
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 50%
   Releaf 0%

1. Plot IV A (1-2)
2. R. lacustre 1 -- G. inermis 51
3. 7/22/27 4 gals. Spray.
4. HCl 4%
5. t_s 58 h_r 43
6. F.W.C. heavy dew, Cd. nights.
7. Defoliation 75%
   Releaf 0.5%

1. Plot IV A (2-2.35)
2. G. inermis 36
3. 7/22/27 5 gals. Spray.
4. CH_3COOH 8%
5. t_s 58 h_r 43
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 25%-35%
   Releaf 1%

1. Plot IV A (2.35-2.5)
2. G. inermis 16
3. 7/22/27 1½ gals. Spray.
4. CH_3COOH 12%
5. t_s 58 h_r 43
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 40%
   Releaf 0%

1. Plot IV A (2.5-2.7)
2. G. inermis 21
3. 7/23/27 1½ gals. Spray.
4. $NaClO_3$ 25% HCl 2%
5. t_s 58 h_r 43
6. F.W.C.H. heavy dew, Cd. night.
7. Defoliation 100%
   Releaf 10%. Stems still alive.

1. Ilex IV A (5-11)
2. B. Inverse 4[illegible]
3. V1521V7 4 gals. Green.
4. C[illegible] 4[illegible]
5. L, SV Sp 44
6. F.W.C. Henry Gen., Fl. Alpre.
7. Definition 1[illegible]
Volume E[illegible]

1. Ilex IV A (5-6)
2. B. Inverse 4[illegible] B. Inverse IV
3. V1521V7 4 gals. Green.
4. SVL 4[illegible]
5. L, SV Sp 44
6. F.W.C. Henry Gen, Fl. Alpre.
7. Definition V5A
Volume E.11

1. Ilex IV A (5-7.5C)
2. B. Inverse 5A
3. V1521V7 5 gals. Green.
4. C[illegible] 4[illegible]
5. L, SV Sp 44
6. F.W.C. Henry Gen, Fl. Alpri.
7. Definition 5[illegible]
Volume I.V

1. Ilex IV A (2.5-5.5C)
2. B. Inverse 15
3. V1521V7 15 gals. Green.
4. Chrysan Ind.
5. L, SV Sp 43
6. F.W.C. Henry Gen, Fl. Alpri.
7. Definition 4[illegible]
Volume C5

1. Ilex IV A (2.5-5.7)
2. B. Inverse 27
3. V1521V7 15 gals. Green.
4. Definition Ind. 2[illegible]
5. L, SV Sp 43
6. F.W.C. Henry Gen, Fl. Alpri.
7. Definition Ilex
Volume IIC. Flora coll. alpr.

Santa, Idaho

1. Plot IV B (2.7-8)
2. G. inermis 30
3. 7/26/27 8 gals. Spray. App.
4. Na_2SO_3 20%
5. t_s 63 h_r 40
6. F.W.C. little dew, sl. Wd. in p.m.
7. Defoliation 10% - 15%
   Releaf 0%

1. Plot IV A (3-4)
2. G. inermis 58
3. 7/26/27 8 gals. Spray.
4. Na_2SO_3 15%
5. t_s 63 h_r 40
6. F.W.C. little dew, sl. Wd. in p.m.
7. Defoliation 10%-15%
   Releaf 0%

1. Plot IV A (4-5)
2. G. inermis 46
3. 7/27/27 6 gals. Spray.
4. Na_2SO_3 15% Ca Caseinate 0.2% as sticker.
5. t_s 59 h_r 38
6. F.W.C.W., little dew, sl. Wd.
7. Defoliation 10%-15%
   Releaf 0%

1. Plot IV A (5-6)
2. G. inermis 45
3. 7/27/27 8 gals. Spray.
4. $CaCl_2$ 4% Glycerine 0.5% as sticker.
5. t_s 58 h_r 38
6. F.W.C.W. little dew, sl. Wd.
7. Defoliation 95%
   Releaf lge. Stems still alive.

1. Plot IV A (6-6.6)
2. R. lacustre 2 -- G. inermis 58
3. 7/26/27 6 gal. Cr. App.
4. Na_2SO_3 15%
5. t_s 58 h_r 20
6. F.W.C. heavy dew, W. in p.m.
7. Defoliation 1% - 5%
   Releaf 0%

Santa, Idaho

1. Plot IV B (0-0.3)
2. G. inermis 24
3. 7/23/27 3½ lbs. Cr. App.
4. CS_2 100%
5. t_s 58 h_r 43
6. F.W.C. heavy dew, cold night.
7. Defoliation 10%
   Releaf 0%

1. Plot IV B (0.3-1)
2. G. inermis 60
3. 7/23/27 6½ lbs. Cr. App.
4. NaOH 2% CS_2 98%
5. t_s 58 h_r 43
6. F.W.C. heavy dew, Cd. night.
7. Defoliation 10%
   Releaf 0%

1. Plot IV B (2-2.2)
2. G. inermis 17
3. 8/23/27 6 gals. Spray.
4. $CH_3C_6H_4OH$ 15%
5. t_s 57 h_r 43
6. Sl.Cy.Cl. R. in a.m.
7. Defoliation 90%
   Releaf 0%

1. Plot IV B (2.2-2.4)
2. G. inermis 18
3. 8/24/27 5 gals. Spray.
4. $CH_3C_6H_4OH$ 25%
5. t_s 56 h_r 66
6. Cy.Cl. T.R. in a.m.
7. Defoliation 95%
   Releaf 0%

1. Plot IV B (2.4-2.65)
2. G. inermis 21
3. 8/25/27 5 gals. Cr. Ap.
4. $CH_3C_6H_4OH$ 10%
5. t_s 56 h_r 87
6. Cy. Cl. S.
7. Defoliation 10%
   Releaf 0%

Bombo, Idaho

Santa, Idaho

1. Plot IV B (2.65-3)
2. G. inermis 32 Spray.
3. 8/26/27 - 10 lbs. Cr. App.
4. $C_6H_4Cl_2$ 100%
5. t_s 54 h_r 78
6. S. Cl.
7. Defoliation 1% - 5%
   Releaf 0%. Buds swelling.

1. Plot V A (0-1)
2. Plot IV B (3-3.5)
3. G. inermis 15 12 gals. Spray.
4. 8/24/27 6 gals. Spray.
5. $C_6H_4Cl_2$ 1% + [illegible] and 54
6. t_s 56 h_r 66
7. Cy.Cl. R. in a.m.
   Defoliation 1% - 5% to be [illegible]
   Releaf 0%

1. Plot V A (1-1.7)
2. Plot IV B (3.5-4)
3. G. inermis 16 Spray.
4. 8/25/27 4 gals. Cr. App.
5. $C_6H_4Cl_2$ 1% +
6. t_s 56 h_r 87
7. Cy.Cl.S.
   Defoliation 5%-10% still alive.
   Releaf 0%

1. Plot V A (1.7-2)
2. Plot IV B (6-6.1)
3. G. inermis 7 Spray.
4. 8/26/27 2-4 lbs. Cr. App.
5. $C_6H_4Cl_2$ 100%
6. t_s 54 h_r 78
7. Cl. S. Cd. night.
   Defoliation 9/15/27
   Defoliation 5% - 10%
   Releaf 0%. Leaves all turned red.

1. Plot V A (2-3)
2. Plot IV B (6.1-6.5)
3. G. inermis 40 Spray.
4. 8/26/27 3 gals. Spray.
5. NH_4Cl 25%
6. t_s 54 h_r 78
7. Cl. S. Cold night.
   Defoliation 75% Defoliation 9/15/27 100%
   Releaf 0%

Empty Index

Santa, Idaho

1. Plot IV B (6.5-6.6)
2. G. inermis 19
3. 8/26/27 2 gals. Spray.
4. $C_6H_4Cl_2$ 1% ±
5. t_s 54 h_r 78
6. Cl. S. Cd. night.
7. Defoliation 5%
   Releaf 0%

1. Plot V A (0-1)
2. G. inermis 93
3. 8/4 and 8/5/27 12 gals. Spray.
4. $NaClO_3$ 25% NH_4Cl 20%
5. t_s 56 and 57 h_r 51 and 54
6. F.W.C. Cold nights.
7. Defoliation 98%
   Releaf 0%. Stems appear to be dead.

1. Plot V A (1-1.7)
2. G. inermis 61
3. 8/9/27 8 gals. Spray.
4. NH_4Cl 30%
5. t_s 55 h_r 44
6. F.W.C.
7. Defoliation 95%. Releaf 1%
   All on one bush. Stems still alive.

1. Plot V A (1.7-2)
2. G. inermis 25
3. 8/13/27 3 gals. Spray.
4. $NaClO_3$ 25% HCl 1%
5. t_s 55 h_r 51
6. F.W.C. Cold night R. (9)
7. Defoliation 50%. Defoliation 9/15/27 100%
   Releaf 1%

1. Plot V A (2-3)
2. G. inermis 41
3. 8/10/27 11 gals. Spray.
4. $KClO_3$ 4% NH_4Cl 10%
5. t_s 55 h_r 44
6. F.W.C. Cold night, heavy dew.
7. Defoliation 85%. Defoliation 9/15/27 100%
   Releaf 10%

Santa, Idaho

1. Plot V A (3-3.7)
2. G. inermis 52
3. 8/11/27 10 gals. Spray.
4. $KClO_3$ 4% NH_4Cl 5%
5. t_s 56 h_r 51
6. F.W.C. 3. Cold night.
7. Defoliation 60-70%. Defoliation 9/15/27 90%
   Releaf 3%

1. Plot V A (3.7-4)
2. G. inermis 18
3. 8/18/27 3.5 gals. Spray.
4. $NaClO_3$ 25% HCl 5%
5. t_s 55 h_r 51
6. F.W.C. Cold night R.(9)
7. Defoliation 60-70%. Defoliation 9/15/27 100%
   Releaf 0.5%

1. Plot V A (4-4.5)
2. G. inermis 23
3. 8/13/27 6 gals. Spray.
4. $NaClO_3$ 25% $MnCl_2$ 0.1%
5. t_s 50 h_r 38
6. F.W.C. Cold night.
7. Defoliation 90%. Defoliation 9/15/27, 100%
   Releaf 0%. Stems still alive.

1. Plot V A (4.4-5)
2. G. inermis 22
3. 8/13/27 6 gals. Spray.
4. $NaClO_3$ 25% $MnCl_2$ 0.2%
5. t_s 50 h_r 38
6. F.W.C. Cold night
7. Defoliation 90%. Defoliation 9/15/27 100%
   Releaf 0%. Stems still alive.

1. Plot V A (1.7-2)
2. G. inermis 25
3. 8/18/27 3 gals. Spray.
4. $NaClO_3$ 25% HCl 1%
5. t_s 55 h_r 51
6. F.W.C. Cold night. R. (9)
7. Defoliation 50%. Defoliation 9/15/27 100%
   Releaf 1%

Route 14/3a

1. Jay 4 A (3-3.4)
2. E. Lincoln SS
3. Cliff 12 gals. Spray.
4. Kelly 4W Edgell Rd
5. Bx 56 Ln 81
6. F.F.C. 2 Cold night.
7. Defoliation 80-75%. Defoliation 9/15/27 100%
Delay 12

Santa, Idaho

1. Plot V A (2-3)
2. G. inermis 41
3. 8/10/27 11 gals. Spray.
4. $KClO_3$ 4% NH_4Cl 10%
5. t_s 55 h_r 44
6. F.W.C. Cold night, heavy dew.
7. Defoliation 85%. Defoliation 9/15/27 100%
   Releaf 10%

1. Plot V A (2-3.7)
2. G. inermis 52
3. 8/11/27 10 gals. Spray.
4. $KClO_3$ 4% NH_4Cl 5%
5. t_s 56 h_r 51
6. F.W.C. S. Cold night.
7. Defoliation 60-70%. Defoliation 9/15/27 90%
   Releaf 3%

1. Plot V A (3.7-4)
2. G. inermis 18
3. 8/18/27 3.5 gals. Spray.
4. $NaClO_3$ 25% HCl .5%
5. t_s 55 h_r 51
6. F.W.C. Cold night. R. (9)
7. Defoliation 60-70%. Defoliation 9/15/27 100%
   Releaf 0.5%

1. Plot V A (5-5.5)
2. G. inermis 37
3. 8/15/27 6 gals. Spray.
4. $NaClO_3$ 25% $MnCl_2$ 0.5%
5. t_s 56 h_r 51
6. F.W.C. Sl. Cy. in p.m.
7. Defoliation 90%. Defoliation 9/15/27 100%
   Releaf 0%. Stems still alive.

1. Plot V A (5.5-6)
2. G. inermis 38
3. 8/15/27 5 gals. Spray.
4. $NaClO_3$ 25% $MnCl_2$ 1.0%
5. t_s 56 h_r 51
6. F.W.C. Sl.Cy. in p.m.
7. Defoliation 90%. Defoliation 9/15/27 100%
   Releaf 0%. Stems still alive.

1. Ilse V A (2-3)
2. D. Imperia 47
3. [illegible] 17 Bldg. Sprue.
4. [illegible] 6A [illegible]
5. Va 7D Jr. 64
6. E.J.C. Data mimeo. Sawyer Corp.
7. Refrigeration Sec. Specification 8/12/27 Item
Waiver 13b

1. Fiat V A (2-2.7)
2. D. Imperia 8C
3. [illegible] 7D Bldg. Sprue.
4. [illegible] 4A [illegible]
5. Va 2C Jr. 83
6. E.J.C. Data mimeo.
7. Refrigeration ED-PDC. Specification 8/12/27 Item
Waiver 3B

1. Ilse V A (2.7-3)
2. D. Imperia 1?
3. [illegible] 3.2 Bldg. Sprue.
4. [illegible] 3AC [illegible]
5. L. 5A Jr. 81
6. E.J.C. Coil mimeo. B. (9)
7. Refrigeration EJ-PDC. Specification 8/15/27 Item
Waiver C.E.

1. Fiat V A (3-3.5)
2. D. Imperia 2?
3. [illegible] 6 Bldg. Sprue.
4. [illegible] 4A [illegible]
5. Va 7D Jr. 8?
6. E.J.C. Pr. Co. 14 Jr.
7. Refrigeration Spec. Specification 8/12/27 Item
Waiver 12a. [illegible]

1. Fiat V A (2.5-3)
2. D. Imperia 2?
3. [illegible] 6 Bldg. Sprue.
4. [illegible] 3AC [illegible]
5. L. 6A Jr. 81
6. E.J.C. Pr. Co.
7. Refrigeration Spec. Specification 8/12/27 Item
Waiver 12. [illegible] mimeo.

Santa, Iisho

1. Plot V A (6-6.6)
2. G. inermis 23
3. 8/16/27 7 gals. Spray.
4. $NaClO_3$ 25% $MnCl_2$ 2.0%
5. t_s 53 h_r 43
6. F.W.C. Wind.
7. Defoliation 85%. Defoliation 9/15/27 100%
   Releaf 0%. Stems still alive.

1. Plot V B (2-2.5)
2. G. inermis 48
3. 8/16 & 8/17/27 9 gals. Spray.
4. $NaClO_3$ 25% NH_4Cl 20% Glycerine 5%
5. t_s 53 and 54 h_r 43 55
6. F.W.C. Wd. 8/17/27 Cl.Cy.Wd.
7. Defoliation 99%.
   Releaf 0%. Stems still alive.

1. Plot V B (2.5-3)
2. G. inermis 40
3. 8/17/27 7.5 gals. Spray.
4. $NaClO_3$ 25% NH_4Cl 20% Glycerine 1%
5. t_s 54 h_r 55
6. Cl.Cy.Wd.
7. Defoliation 99%
   Releaf 0%

1. Plot V B (3.5-4)
2. G. inermis 16
3. 8/19/27 6 gals. Spray.
4. $NaClO_3$ 25% NH_4Cl 20%
5. t_s 54 h_r 52
6. F.W.C. H.in p.m.
7. Defoliation 70%. Defoliation 9/15/27 100%
   Releaf 0%. New growth and some of old growth dead.

1. Plot V B (4-4.5)
2. G. inermis 17
3. 8/19 and 8/20/27 6 gals. Spray.
4. $NaClO_3$ 51% sat.
5. t_s 54 58 h_r 52
6. F.W.C.
7. Defoliation 100% [illegible] 2% at terminal [illegible]
   Releaf 0%. Stems still alive.

Scene. Line

Santa, Idaho

1. Plot V B (4.5-5)
2. G. inermis 15
3. 8/20/27 4 gals. Spray.
4. $ZnCl_2$ 25%
5. t_s 58 h_r 52
6. F.W.C.
7. Defoliation 98%
   Releaf 0%. 1927 growth dead.

1. Plot V B (5-5.5)
2. G. inermis 10
3. 8/20/27 2 gals. Spray.
4. $NaClO_3$ 25% $ZnCl_2$ 15%
5. t_s 58 h_r 52
6. F.W.C.
7. Defoliation 93%
   Releaf 0%. 1 bush undefoliated.

1. Plot V B (5.5-6)
2. G. inermis 18
3. 8/22/27 4 gals. Spray.
4. $KClO_3$ 5% $ZnCl_2$ 25%
5. t_s 54 h_r 43
6. S.Sl.Cy.Cl.
7. Defoliation 100%
   Releaf 0%. Stem still alive.

1. Plot X 7 (S.E.)
2. Not measured.
3. 8/2/27 6 gals. Spray.
4. $KClO_3$ 4% CH_3COOH 1%
5. t_s 59 h_r 52
6. F.W.C.
7. Defoliation 85%. Releaf 0%
   9/15/27--R. petiolare 100% defoliated
   G. inermis 85%

1. Plot X 1 (W.)
2. Not measured.
3. 8/2/27 2 gals. Spray.
4. K_2SO_4 sat.
5. t_s 59 h_r 52
6. F.W.C.
7. Defoliation 40%. Releaf 2% on terminal buds.
   Other buds swelling.

1. [illegible] 7 3 (4.-8)
2. [illegible] 10
3. [illegible] 4 [illegible]. Normal.
4. [illegible] 600
5. [illegible] 32 Do 20
6. [illegible].
7. [illegible]

1. [illegible] 7 8 (8-8.)
2. [illegible] 15
3. [illegible] 8 [illegible]. Heavy.
4. [illegible] [illegible] [illegible], 1st
5. [illegible] 8E Do 20
6. [illegible].
7. [illegible]
[illegible] 6E. [illegible] [illegible].

1. [illegible] 4 (2.-)
2. [illegible] 15
3. [illegible] 4 [illegible]. Heavy.
4. [illegible] [illegible] [illegible]
5. [illegible] 8E Do 40
6. [illegible].
7. [illegible]
[illegible] 6E. [illegible] [illegible].

1. [illegible] 2 (8.4.)
2. [illegible]
3. [illegible] 8 [illegible]. Normal.
4. [illegible]
5. [illegible] 8E Do 60
6. [illegible].
7. [illegible]

1. [illegible] 1 [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible] 8E Do 12
6. [illegible].
7. [illegible] [illegible] on terminal [illegible].

Table No. 10

July Chemical Application Summary.
Santa, Idaho

Date	Plot	Chemical Used	Concentration	How Applied	Amount Used	Defoliation Days
July 2 and 7	III A (2-3)	Leaves Stripped by Hand.				--
" 5	II A (2-3)	$KClO_3$ NH_4NO_3	5% 10%	Spray	14 gallons	100% 6 days
" 6	II B (2-3)	$KClO_3$ CH_3COOH	5% 1%	"	12 gallons	50% 5 days 20% 12 days
" 7	I A (1-2)	NaOH	4%	Respray	16 gallons	100% 1 day
" 8	I A (6-6.6)	$NaClO_3$ CH_3COOH	25% 1%	Spray	10 gallons	100% 6 days
" 9	I A (5-6)	$NaClO_3$ NaOH	25% 2%	"	13 gallons	100% 4 days
" 11	II A (0-1)	$NaClO_3$ HCl	25% 1%	"	8 gallons	100% 6 days
" 12	See notes	$NaClO_3$	25%	"	¾ gallon	100% 3 days
" 13	" "	$NaClO_3$	25%	"	½ gallon	100% 3 days
" 13	" "	$NaClO_3$	25%	"	¼ gallon	100% 3 days
" 14	II A (3-4)	$Al_2(SO_4)_3$	25%	"	9 gallons	50% 6 days
" 14	Balance of above plot.	K_2SO_4	Saturated Solution	"	2 gallons	50% 6 days
" 15	III A (5-6)	$(NH_4)_2S_2O_8$	25%	"	3 gallons	100% 2 days
" 15	Balance of above plot.	$(NH_4)_2S_2O_8$	15%	"	3 gallons	50% 4 days
" 16	III A (6-6.6)	$Al_2(SO_4)_3$	20%	"	3 gallons	50% 6 days
" 16	II A (6-6.6)	$KMnO_4$ HCl	15% 3%	"	2 gallons	25% 7 days
" 18	III A (4-5)	$Na_2Cr_2O_7$	50%	"	1½ gallons	100% 7 days
" 18	Balance of above plot.	$Na_2Cr_2O_7$	25%	"	2 gallons	75% 7 days
" 19	III B (4-5) III A (4-5) Bal.	HCl $KMnO_4$	3% Saturated	"	6 gallons	15 or 25% 2 weeks
" 19	III B (3-4)	$KMnO_4$	Saturated	Crown Application	4 gallons	10 to 15% 2 weeks
" 19 - 20	III B (5-6) III A (3-4) Bal.	K_2SO_4	Saturated Solution	Crown Application	12 gallons	10 to 15% 2 weeks
" 21	IV A (0-1)	$HClO_4$	4%	Spray	4 gallons	50 to 60% 4 days
" 22	IV A (1-2)	HCl	4%	"	4 gallons	70 to 80% 3 days
" 22	IV A (2.0-2.35)	CH_3COOH	8%	"	5 gallons	40% 3 days
" 22	IV A (2.35-2.5)	CH_3COOH	12%	"	1½ gallons	45 - 60% 3 days
" 23	IV B (0-3)	CS_2	100%	Crown Application	3½ pounds	10 to 20% 7 days
" 23	IV B (0.3-1)	NaOH CS_2	2% 100%	Crown Application	4½ pounds	10 to 15% 7 days
" 23	IV A (2.5-2.7)	$NaClO_3$ HCl	25% 2%	Spray	1½ gallons	70% 7 days
" 26	IV A (2.7-3)	Na_2SO_3	20%	"	5 gallons	10 to 20% 5 days
" 26	IV A (3-4)	Na_2SO_3	15%	"	8 gallons	10 to 15% 5 days
" 27	R. petiolare	Na_2SO_3	15%	"	2 gallons	10% 4 days
" 27	IV A (4-5)	Ca Caseinate Na_2SO_3	2% 15%	"	6 gallons	10% 4 days
" 27	IV A (5-6)	Glycerine $KClO_3$	1% 4%	"	6 gallons	50%
" 28 - 29	IV A (6-6.6)	Na_2SO_3	15%	Crown Application	6 gallons	No defoliation 4 days
" 7	R. petiolare	$KClO_3$ NH_4NO_3	4% 2%	Spray	4 gallons	100% 3 days
" 8	R. petiolare	$NaClO_3$ CH_3COOH	25% 1%	"	2 gallons	100% 4 days
" 9	R. petiolare	$NaClO_3$ NaOH	25% 2%	"	1½ gallons	100% 4 days
" 12	R. petiolare	$NaClO_3$ HCl	25% 2%	"	1½ gallons	100% 4 days

1937 Annual Report
E. R. Offord

Table 11

Daily Soil Temperature, Humidity and Kestner Record, Sante, Idaho.

Date	Soil Temperature			Wet and Dry Bulb Difference			Weather Log
	7 a.m.	12 m.	4 p.m.	7 a.m.	12 m.	4 p.m.	
July 1	56	57	58	15°	10.5°	10°	FWC Heavy Dew. Sl wind.
" 2	56	56	59	12	11.5	12.5	FWC
" 3							Rainy
" 4							Rain a.m. FWC p.m.
" 5							FWC
" 6	54	56	60	2	22.5	19.5	FWC Heavy Dew. Cold nights.
" 7	54	56	60	6.5	12	20	FWC Heavy Dew. Cold nights.
" 8	56	57	60	7	14.5	16.5	FWC Heavy Dew. Cold nights. sl wind p.m.
" 9	58	59	60	7.5	--	15	FWC Heavy Dew. Cold nights
" 10	52	58	58	6	14	8.5	" " " " "
" 11	54	57	58	4	7	5.5	Cloudy, cool. Heavy dew, cool night.
" 12	57	60	62	4.5	7.5	17	FWC Rain p.m. Also during night.
" 13	56	58	61	6.5	11	14	Cloudy, warm, heavy dew.
" 14	55	57	62	4	10	9.5	Cloudy, cool, little dew. Cool night.
" 15	54	55	60	5	12	12	FWC Cool night, heavy dew.
" 16	56	58	60	5	5	8	FWC heavy dew, cool night. Fog a.m.
" 17	56	58	64	4.5	9.5	9	FWC heavy dew, cool night.
" 18	56	58	61	13	9	26	FWC heavy dew, cool night.
" 19	55	58	60	15	23	14	FWC. Hot p.m. Heavy dew, cold night.
" 20	54	57	60	15	12.5	13	FWC, heavy dew, cold night, hot p.m.
" 21	53	56	61	11	11	15	FWC, heavy dew, cold night, hot p.m.
" 22	54	58	62	13	11.5	17	FWC, heavy dew, cold night, very hot p.m.
" 23	54	57	63	13	11.5	17	FWC, heavy dew, cold night, very hot p.m.
" 24	56	59	63	16	14	18	FWC, heavy dew. Cold night. Hottest day.
" 25	53	62	66	13	21.5	28.5	Rainy a.m., FWC p.m.
" 26	60	62	66	20	16	15	FWC, very little wind and dew.
" 27	57	60	61	15	17	16	FWC, hot p.m. Slight wind p.m.
" 28	55	59	60	19	30	29	FWC, hot p.m. Heavy dew.
" 29	56	59	60	13	20	13	FWC, hot p.m. Heavy dew.
" 30	56	58	60	16	12	15	FWC, hot p.m. Very little dew.
" 31	57	58	62	12	4	3	FWC, cloudy p.m. Hot.

Legend: F--Fair; W--Warm; C--Clear.

Daily Soil Temperature, Humidity and Weather Record, Santa, Idaho.

Date	Soil Temperature				Wet and Dry Bulb Difference				Weather Log
	6 a.m.	12 m.	6 p.m.	12 p.m.	6 a.m.	12 m.	6 p.m.	12 p.m.	
April 1	58	72	68	60	Zero	10°F.	10°F.	3°F.	Rain p.m.
" 2	58	74	68	60	2	15°F.	13°F.	4	Rain a.m. Clear p.m.
" 3									Rain a.m. Clear p.m.
" 4									Rain a.m. Clear p.m.
" 5									Rain a.m. Clear p.m.
" 6	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 7	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 8	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 9	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 10	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 11	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 12	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 13	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 14	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 15	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 16	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 17	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 18	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 19	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 20	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 21	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 22	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 23	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 24	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 25	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 26	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 27	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 28	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 29	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
" 30	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.
May 1	52	72	68	56	2	15°F.	12°F.	2	Clear day. Cool night.

Table No. 12

August Chemical Application Summary, Sante, Idaho

Date	Location	Chemical	Concentration	Method of Application	Amount	Defoliation in Days
August 2	S.E. X 7	$KClO_3$ CH_3COOH	4% 1%	Spray	6 gallons	85% 7 days
" 2	W. X 1	K_2SO_4	Saturated	"	2 gallons	40% 10 days
" 3	R. petiolare	K_2SO_4	"	Crown Application	2 gallons	20% 14 days
" 4 & 5	V A (0-1)	$NaClO_3$ NH_4Cl	25% 20%	Spray	12 gallons	98% 5 days
" 5	II B (0-.5)	$NaClO_3$	25%	"	11 gallons	90% 6 days
" 6	II B (.5-1)	$NaClO_3$ Glue	25% 0.1%	"	12 gallons	98% 6 days
" 6 & 8	II B (1-1.5)	$NaClO_3$ Fish Oil Soap	25% 1.0%	"	7 gallons	95% 7 days
" 8	II B (1.5-2)	$NaClO_3$ Ca Casienate	25% 2%	"	7 gallons	98% 7 days
" 9	V A (1-1.7)	NH_4Cl	30%	"	8 gallons	95% 6 days
" 10	V A (2-3)	$KClO_3$ NH_4Cl	4% 10%	"	11 gallons	85% 5 days
" 11	V A (3-3.7)	$KClO_3$ NH_4Cl	4% 5%	"	10 gallons	60 - 70% 4 days
" 13	V A (4-4.5)	$NaClO_3$ $MnCl_2$	25% 0.1%	"	6 gallons	90% 6 days
" 13	V A (4.5-5)	$NaClO_3$ $MnCl_2$	25% 0.2%	"	6 gallons	90% 7 days
" 15	V A (5-5.5)	$NaClO_3$ $MnCl_2$	25% 0.5%	"	6 gallons	90% 7 days
" 15	V A (5.5-6)	$NaClO_3$ $MnCl_2$	25% 1.0%	"	5 gallons	90% 7 days
" 16	V A (6-6.6)	$NaClO_3$ $MnCl_2$	25% 2%	"	7 gallons	85% 6 days
" 16 & 17	V B (2-2.5)	$NaClO_3$ Glycerine NH_4Cl	25% 5% 20%	"	9 gallons	99% 5 days
" 17	V B (2.5-3)	$NaClO_3$ NH_4Cl Glycerine	25% 20% 1%	"	7.5 gallons	99% 5 days
" 18	V A (1.7-2)	$NaClO_3$ HCl	25% 1%	"	3 gallons	50% 4 days
" 18	V A (3.7-4)	$NaClO_3$ HCl	25% .5%	"	3.5 gallons	60-70% 4 days
" 19	V B (3.5-4)	$NaClO_3$ NH_4Cl	25% 20%	"	6 gallons	70% 3 days
" 19 & 20	V B (4-4.5)	$NaClO_3$	51%	"	6 gallons	100% 9 days
" 20	V B (4.5-5)	$ZnCl_2$	25%	"	4 gallons	98% 8 days
" 20	V B (5-5.5)	$NaClO_3$ $ZnCl_2$	25% 15%	"	2 gallons	98% 8 days
" 22	V B (5.5-6)	$KClO_3$ $ZnCl_2$	5% 25%	"	4 gallons	100% 7 days
" 23	IV B (2-2.2)	$CH_3C_6H_4OH$	15%	"	6 gallons	95% 7 days
" 24	IV B (2.2-2.4)	$CH_3C_6H_4OH$	25%	"	5 gallons	95% 5 days
" 24	IV B (3-3.5)	$C_6H_4Cl_2$	1%	"	6 gallons	5-10% 4 days
" 25	IV B (2.4-2.65)	$CH_3C_6H_4OH$	10%	Crown Application	5 gallons	10% 4 days
" 25	IV B (3.5-4)	$C_6H_4Cl_2$	Saturated	Crown Application	4 gallons	5% 4 days
" 24	V B (6-6.6)	K_2SO_4	Dry	Crown Application	5-6 pounds	5-10% 3 days
" 26	IV B (2.65-3)	$C_6H_4Cl_2$	Dry	Crown Application	10 - 12 pounds	5-10% 3 days
" 26	IV B (6-6.1)	$C_6H_4Cl_2$	Dry	Crown Application		5-10% 3 days
" 26	IV B (6.1-6.5)	NH_4Cl	25%	Spray	3 gallons	75% 3 days
" 26	IV B (6.5-6.6)	$C_6H_4Cl_2$	Saturated Solution	"	2 gallons	5% 3 days

Table No. 13

Daily Soil Temperature, Humidity and Weather Record, Santa, Idaho.

Date	Soil Temperature			Wet and Dry Bulb Difference			Weather Log
	7 a.m.	12 m.	4 p.m.	7 a.m.	12 m.	4 p.m.	
August 1	56	58	62	6	17	5	F.W. Sl. Cy. Sl. S.
" 2	56	59	62	6	15	7	F.W.C.
" 3	55	58	62	6	8	4	F.W.C. Hot in p.m.
" 4	53	55	60	4	19	4	F.W.C. Cold night
" 5	54	58	60	10	8	13	F.W.C. Cold night.
" 6	53	57	61	3	10	15	F.W.C. Cold night.
" 7	54	57	60	12	12	12	F.W.C. Cold night.
" 8	54	57	58	80	17	15	F.W.C. Cold night.
" 9	52	55	58	6	16	12	F.W.C. Cold night.
" 10	50	55	60	8	17	11	F.W.C. Heavy dew.
" 11	52	57	60	17	11	12	F.W.C Smoky.
" 12	54	56	58	1	6	6	R. Cl. Cy.
" 13	47	48	54	6	13	19.5	F.W.C. Cold night.
" 14	--	--	St.	Maries	--	--	--
" 15	54	56	59	5	12	11	F.W.C. Sl. Cy.
" 16	50	52	57	7	15	14	F.W.C. Wind
" 17	50	54	58	8	11	9	Cy.Cl.Wd.
" 18	52	55	59	3	8	15	F.W.C. Cold night. Rain a.m.
" 19	50	54	58	6	12	10	F.W.C. Hot in p.m.
" 20	55	58	60	6	11	11	F.W.C.
" 21	55 (10 a.m)		60	13	--	2	F.W.C. Smoky.
" 22	50	54	57	6	21	8	S. Sl.Cy. Cl.
" 23	54	57	60	8	15	14	Cl. Cy Rain in a.m.
" 24	54	55	58	4.5	6	8	Cl. Cy.
" 25	49	52	56	1.5	0.5	4	Cl. Cy. Cold night.
" 26	52	54	55	2.5	7	1	Smoky Cl.
" 27	50	53	57	1.0	4	7	R. Cl.
" 28	50	--	60	2	--	2	Sl. Cy.
" 29	54	56	56	1	2	2	F.W.C. Rain in p.m.
" 30	47	54	58	1	4	2	Foggy. Cy.Cl.

Legend: F--Fair; W--Warm; C--Clear; Sl.--Slightly; Cy.--Cloudy; R.--Rain; H--Hot; S--Smoky; Cl.--Cool

Table No. 10

Daily Soil Temperature, Humidity and Weather Record, Bureau Lands.

Date	Soil Temperature				Wet and Dry Bulb Differences				Weather Code
	7 a.m.	1 p.m.	7 p.m.	10 p.m.	7 a.m.	1 p.m.	7 p.m.	10 p.m.	
August 1	72	82	78	74	2	12	4	3	Clear. Light breeze.
2	73	84	80	75	3	14	5	4	Clear. Light breeze.
3	74	85	81	76	3	15	6	4	Clear. Light breeze.
4	75	86	82	77	4	16	7	5	Clear. Light breeze.
5	76	87	83	78	4	17	7	5	Clear. Light breeze.
6	77	88	84	79	5	18	8	6	Clear. Light breeze.
7	78	89	85	80	5	19	8	6	Clear. Light breeze.
8	79	90	86	81	6	20	9	7	Clear. Light breeze.
9	80	91	87	82	6	21	9	7	Clear. Light breeze.
10	81	92	88	83	7	22	10	8	Clear. Light breeze.
11	82	93	89	84	7	23	10	8	Clear. Light breeze.
12	83	94	90	85	8	24	11	9	Clear. Light breeze.
13	84	95	91	86	8	25	11	9	Clear. Light breeze.
14	85	96	92	87	9	26	12	10	Clear. Light breeze.
15	86	97	93	88	9	27	12	10	Clear. Light breeze.
16	87	98	94	89	10	28	13	11	Clear. Light breeze.
17	88	99	95	90	10	29	13	11	Clear. Light breeze.
18	89	100	96	91	11	30	14	12	Clear. Light breeze.
19	90	101	97	92	11	31	14	12	Clear. Light breeze.
20	91	102	98	93	12	32	15	13	Clear. Light breeze.
21	92	103	99	94	12	33	15	13	Clear. Light breeze.
22	93	104	100	95	13	34	16	14	Clear. Light breeze.
23	94	105	101	96	13	35	16	14	Clear. Light breeze.
24	95	106	102	97	14	36	17	15	Clear. Light breeze.
25	96	107	103	98	14	37	17	15	Clear. Light breeze.
26	97	108	104	99	15	38	18	16	Clear. Light breeze.
27	98	109	105	100	15	39	18	16	Clear. Light breeze.
28	99	110	106	101	16	40	19	17	Clear. Light breeze.
29	100	111	107	102	16	41	19	17	Clear. Light breeze.
30	101	112	108	103	17	42	20	18	Clear. Light breeze.
31	102	113	109	104	17	43	20	18	Clear. Light breeze.

Legend: F--Fair; C--Cool; T--Temperate; Cy--Cloudy; R--Rain; Sh--Shower; Th--Thunder; L--Light; H--Heavy; W--Wind; Dr--Drizzle; Sn--Snow; Hail; Fog; Mist.

Discussion. Seventy-three spray formulae were tested as Ribes killers. A summary of this work appears in the preceding tables. Early observations point to some interesting results from a formula $NaClO_3$ - 25% + NH_4Cl - 10%. Ammonium persulphate also looks favorable. Addition of 1 to 2% of a strong or weak acid to $NaClO_3$ seems to have the same inhibiting effect as did the addition of a strong or weak base. A more careful adjustment of the P_H value by means of a hydrolyzed salt such as NH_4Cl will probably be more effective. Chlorate sprays to which were added (0.1 to 2.0%) $MnCl_2$ (Note: Mn promotes oxidation in life processes of plants) look favorable to date but are rather too recent experiments to be indicative of final results. Final data on these plots will be taken in the spring of 1928.

IV. (1). Bovill, Idaho, June 23-August 15

This area represented similar working conditions to those encountered at Clarkia, Idaho. The area contained R. petiolare, G. inermis and R. lacustre mixed with very heavy stream bottom brush.

The east fork of Potlatch Creek was traversed and mapped over two miles of its length starting at Frye Meadow and ending at old Winton Camp. The area was divided into eight blocks and Ribes data were taken every quarter mile (by a crew of six men, five men in line and a recorder) on a strip 1/2 chain wide and then applied over the acreage on that particular block.

Table No. 14 gives the complete Ribes data.

Table No. 14

Ribes Data, Rovill, Idaho

Block	Strip	Area in Acres	R. petiolare Live Stem	R. petiolare Dead Stem	R. lacustre Live Stem	R. lacustre Dead Stem	G. inermis Live Stem	G. inermis Dead Stem	R. visco. Live Stem	R. visco. Dead Stem
I	1 & 2	1.59	2,289	20	2,450	5	776	0	0	0
I		Stem per Acre	1,441	12.5	1,540	3.2	448	0	0	0
II	1 & 2	.83	1,977	0	887	0	3,425	0	0	0
II		Stem per Acre	2,382	0	1,068	0	4,130	0	0	0
II	Total	17.185	96,589	341	21,145	10	56,987	0	230	0
III	1 & 2	.62	7,410	0	470	0	899	5	0	0
III		Stem per Acre	11,950	0	757	0	1,448	8.3	0	0
III	Total	13.235	129,417	213	22,721	0	50,955	12	237	0
IV	1 & 2	1.14	8,049	0	407	0	9,300	10	274	5
IV		Stem per Acre	7,049	0	356	0	8,150	8.8	240	4.4
V	1 & 2	1.10	634	0	1,444	0	328	0	0	0
V		Stem per Acre	576	0	1,314	0	298	0	0	0
VI	1 & 2	.67	2,406	0	966	0	1,013	0	45	0
VI		Stem per Acre	3,595	0	1,442	0	1,515	0	67	0
VII	1 & 2	.70	4,250	2	188	0	237	0	10	0
VII		Stem per Acre	6,070	2.9	269	0	339	0	14.3	0
VIII	1 & 2	1.320	4,123	0	1,969	0	1,140	0	5	0
VIII		Stem per Acre	3,170	0	1,512	0	878	0	3.9	0

Feet of stem per acre was calculated in every block from the two five-chain strips at beginning of each block.

Blocks I, II, and III were later reworked for Ribes data on the basis of a complete cruise. The following data which compare the two methods are rather interesting and are about as inconsistent as one would expect:

Table No. 15

Block No.	R. petiolare Live Stem per Acre 0.5-chain Strip	R. petiolare Live Stem per Acre Complete Cruise	R. lacustre Live Stem per Acre 0.5-chain Strip	R. lacustre Live Stem per Acre Complete Cruise	G. inermis Live Stem per Acre 0.5-Chain Strip	G. inermis Live Stem per Acre Complete Cruise
I	1,441	5,040	1,540	1,518	448	6,485
II	2,382	5,650	1,068	1,230	4,130	3,720
III	11,950	9,775	757	1,715	1,448	3,950

Table No. 14

Comparison of Live Stem figures for G. inermis on Block I illustrates the error which can easily be made by the strip method when the line is run through extremely dense brush. Ribes can be present in heavy concentration a few feet off the line and are never seen by the crew men or recorder.

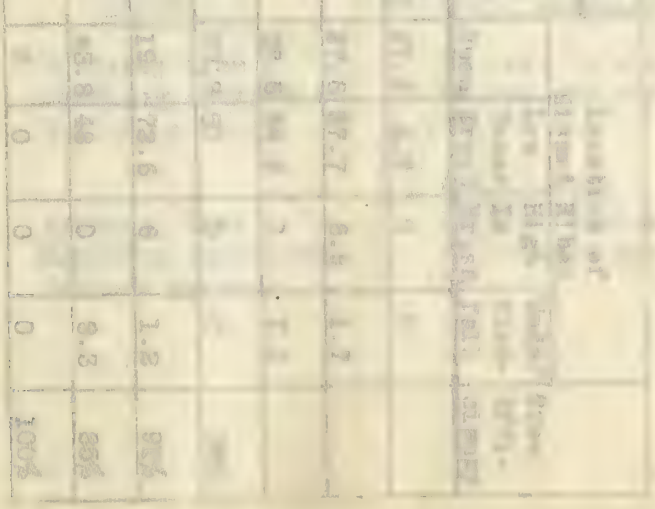
Large scale spraying operations at Bovill, Idaho, were carried out by a six-man crew with P. B. Bell in charge. Details of the work are fully covered in a special report on crew management by Bell. A summary of the spraying work is given below.

Table No. 16

Block	Section	Chemical	Acres	Gallons	Man Spraying Hours
I	1	$NaClO_3$ 25%	9.155	588.5	177.2 hours
I	2	$NaClO_3$ 25% Whale oil soap 1%	6.105	370.5	111.2 hours
II	1	$NaClO_3$ 25% Glue .03%	5.435	353.5	91.1 hours
II	2	$NaClO_3$ 20%	6.875	425.5	103.2 hours
Total			27.57	1,738.0	482.7 hours

Block	Section	Actual Spraying Days
I	1	9
I	2	5
II	1	4
II	2	6

After a number of days of crew spraying, it was thought advisable to recheck the sprayed areas and take data on missed Ribes. The following table drawn up by P. B. Bell shows the nature and location of missed bushes:



Comparison of Live Steam Figures for S. Inermis on Block I

illustrates the error which can easily be made by the strip method when the line is run through extremely dense brush. Ribes can be present in heavy concentration a few feet off the line and are never seen by the crew man or recorder.

Large scale spraying operations at Devil, Idaho, were carried out by a six-man crew with P. B. Bell in charge. Details of the work are fully covered in a special report of crew management by Bell. A summary of the spraying work is given below.

Table No. 14

Block	Section	Chemical	Acres	Gallons per Acre	Man Hours per Acre
I	1	[illegible]	[illegible]	[illegible]	[illegible]
I	2	[illegible]	[illegible]	[illegible]	[illegible]
II	1	[illegible]	[illegible]	[illegible]	[illegible]
II	2	[illegible]	[illegible]	[illegible]	[illegible]
Total			[illegible]	[illegible]	[illegible]

After a number of days of crew spraying, it was thought advisable to recheck the sprayed areas and take data on missed Ribes. The following table drawn up by P. B. Bell shows the nature and location of missed bushes:

Table No. 17

Rechecking Data on Block I, Boyill, Idaho.

Species	No. of Plants Not Completely Sprayed	Acres Sprayed	Spray Symbol	Section	Ft. of Undefoliated System	% of Defoliation	Portion of Plant not Completely Sprayed: End of Stem	Whole Branch or Stem	Half Stem or Branch	Complete Miss	Location of Missed Ribes: Open	Low Under Brush	High In Brush	Under Windfall	Crew Efficiency
R.pet.	23	9.155	I	1	169	99.73	9.1	77.2	9.1	Not taken sep.sect.1	27.3	5.9	0	0	
G.inerm.	58	"	I	1	153.5	99.73	37.3	53.5	6.9	"	27.6	57.7	6.9	1.7	
R.lac.	14	"	I	1	36	99.67	14.3	85.8	0	"	28.6	64.2	0	7.1	
R.pet.	6	6.105	II	2	20	99.82	0	0	16.6	100	33.3	50	0	0	98%
G.inerm.	84	"	II	2	281	97.69	60.7	3.6	3.6	34.6	19	72.6	6	1.2	91%
R.lac.	48	"	II	2	169	99.6	12.5	4.2	10.4	68.8	43.8	48	0	8.3	85%
R.visc.	0	"	II	2	0	100.00	0	0	0	0	0	0	0	0	100%

On August 15th the crew started experimental work with power equipment at Clarkia, Idaho.

Several days were spent in trying out various combinations of hose lines and volume discharge and pressure tests were made using hose lengths varying from 50' to 700'. Location and set-up of the pumper, length of hose lines, handling of lines over areas, relative lengths of main line and laterals, hose couplings, number of spraying nozzles, ground to be covered by each spray line, handling chemical, making up solutions and keeping the solutions in the supply reservoirs, moving equipment from one set-up to another and combinations of two or more pumpers for spraying and relaying chemical, were among the salient points worked over and discussed.

The present working plan seems to lend itself to a seven-man crew, whose duties are divided up as follows: A foreman who blocks out the areas, selects the set-ups for the pumper, lays the main hose line with its attached "T" and keeps the hose lines of the men straightened out, a mechanic who runs the engine and keeps a constant supply of solution in the spraying tanks; five crew men in line, one of whom acts as an assistant foreman and is directly responsible for the efficiency of the men at work on the nozzles. The assistant foreman and the mechanic are responsible for the movement of all equipment.

Blocks I and II were worked over in crew formation (6 ft. between each man) and the data on gallons of solution used, man spraying hours, man hours, handling of equipment were compared with that data obtained last year when the same blocks were eradicated by hand sprayers. Comparative data are as follows:

Block I	Hand Spraying
Spraying time -	47 hrs. 42 mins.
Gallons sprayed -	98
Acreage -	4.17

Block I	Power Spraying--Pacific Pumper
Spraying time -	16 hrs. 24 mins.
Handling equipment-	14 hrs. 12 mins.
Gallons sprayed	109
	Ross Pumper
Spraying time -	12 hrs. 2 mins.
Handling equipment-	13 hrs. 54 mins.
Gallons sprayed -	105

On August 15th the crew started experimental work with power equipment at Clarkia, Idaho.

Several days were spent in trying out various combinations of hose lines and volume discharge and pressure tests were made using hose lengths varying from 50' to 700'. Location and setup of the pumper, length of hose lines, handling of lines over areas, relative lengths of main line and laterals, hose couplings, number of spraying nozzles, ground to be covered by each sprayer line, handling chemical, making up solutions and keeping the solutions in the supply receptacle, moving equipment from one set-up to another and combinations of two or more pumpers for spraying and relaying chemical, were among the salient points worked over and discussed.

The present working plan seems to lend itself to a seven-man crew, whose duties are divided up as follows: A foreman who blocks out the areas, selects the set-ups for the pumper, lays the main hose line with its attached "Y" and keeps the hose lines of the men straightened out, a mechanic who runs the engine and keeps a constant supply of solution in the spraying tanks; five other men in line, one of whom acts as an assistant foreman and is directly responsible for the efficiency of the men at work on the nozzles. The assistant foreman and the mechanic are responsible for the movement of all equipment.

Blocks I and II were worked over in crew formation (6 ft. between each man) and the data on yields of solution used, man spraying hours, man hours handling of equipment were compared with that data obtained last year when the same blocks were sprayed by hand sprayers. Comparative data are as follows:

Block I	Hand Sprayer
Spraying time -	37 hrs. 41 min.
Gallons sprayed -	34
Acreage -	6.17

Block I	Power Spraying--Locality Clarkia
Spraying time -	12 hrs. 24 mins.
Handling equipment-	14 hrs. 12 mins.
Gallons sprayed	136

	Hose Spraying
Spraying time -	15 hrs. 3 mins.
Handling equipment-	14 hrs. 23 mins.
Gallons sprayed -	136

Block II		Hand Spraying
Spraying time	-	66 hrs. 36 mins.
Gallons Sprayed	-	224
Acreage	-	1-1/2

Block II		Power Spraying--Ross Pumper
Spraying time	-	23 hrs. 44 mins.
Handling equipment	-	19 hrs. 32 mins.
Gallons Sprayed		216
		Pacific Pumper
Spraying time	-	19 hrs. 0 mins.
Handling equipment	-	11 hrs. 36 mins*
Gallons sprayed	-	152**

*Cut out one set-up by hose management.
**Brush very wet during first part of spraying

After working with the two pumpers, Ross and Pacific, it is evident that neither one exactly meets our requirements. The light weight of the Pacific Pumper is a decided advantage, but the finer atomization of the spray obtained by working at higher pressures with the Ross Pumper is also desirable. The work so far has been very encouraging and indicates that a decided saving can be affected by means of power equipment, although it seems certain that hand spraying will always have to be considered as an integral part of our most efficient scheme of chemical eradication. Outlying sections of our swamp type where the Ribes occur in lower concentration and somewhat scattered can be more economically eradicated by means of the more mobile hand spraying crew.

A detailed report and analysis of data on power spraying are given in a special report on crew management by F. B. Bell.

Plane II	Hand Spraying
Spraying time	- 66 hrs. 36 mins.
Gallons Sprayed	- 384
Average	1-1/2

Plane II	Power Sprayer--Two Pumps
Spraying time	- 23 hrs. 44 mins.
Refilling equipment	- 13 hrs. 22 mins.
Gallons Sprayed	816

	Pacific Power
Spraying time	- 19 hrs. 7 mins.
Refilling equipment	- 11 hrs. 24 mins.
Gallons Sprayed	- 1520

Cut out the set-up by hose arrangement.
Run very wet during first part of spraying.

After starting with the two pumpers, Hose and Pacific, it is evident that neither one exactly meets our requirements. The light weight of the Pacific Pumper is a decided advantage, but the finer adomization of the spray obtained by working at higher pressures with the Hose Pumper is also desirable. The work so far has been very encouraging and indicates that a desired saving can be effected by means of power equipment, although it seems certain that hand spraying will always have to be considered as an integral part of our most efficient scheme of chemical eradication. Outlying sections of our swamp type where the Ribes occur in lower concentration and somewhat scattered can be more economically eradicated by means of the more mobile hand spraying crew.

A detailed report and analysis of data on power spraying are given in a special report on crew management by P. B. Bell.

Table No. 18

Total Costs Chemical Eradication Work
June 1 - - September 10.

Item	Crew Work Bovill & Clarkia	Experimental Work. Santa	Experimental Work Stanislaus Forest	Total
Payroll	$1,518.42	$ 646.67	$ 156.67	$2,321.76
Subsistence and Transportation	938.60	312.08	174.26	1,424.94
Equipment 1927 and 1926 & 1925 Charge	152.33	60.93	30.47	243.73
Repairs, Hauling and Freight	32.43	12.97	6.49	51.89
Chemical	281.54	201.34	58.49	541.37
Power Sprayer	786.00			786.00
Totals	$3,709.32	$1,233.99	$426.38	$5,369.69

Total Man Hours Field Work - [illegible] Cost per Man Hour - $1.05

Cost of Experimental Work at Berkeley - October, 1926 to June, 1927.

Payroll	$1,136.76
Subsistence and Transportation	75.00
Chemical and special Apparatus	90.23
	$1,201.99

Table No. 14

Total Costs Treated Preliminary Dyes.
June 1 - September 30.

Item	Crew work Small & Tools	Incidental Exp. Items	Departmental Work Supplied from Stores	Total
Payroll	[illegible]	[illegible]	[illegible]	[illegible]
Maintenance and Transportation	[illegible]	[illegible]	[illegible]	[illegible]
Equipment Rent and Light & Power Charges	[illegible]	[illegible]	[illegible]	[illegible]
Repairs, Hauling and Freight	[illegible]	[illegible]	[illegible]	[illegible]
Chemical	[illegible]	[illegible]	[illegible]	[illegible]
Dyer Dyeing	[illegible]			[illegible]
Total =	[illegible]	[illegible]	[illegible]	[illegible]

Total Dyes Tools Dyeing = [illegible]

Cost of Dyeing and Tools at Dyeing - October, [illegible]

Payroll [illegible]
Maintenance and Transportation [illegible]
Chemicals and Special Dyestuffs [illegible]
[illegible]

Table No. 19

Chemical Eradication Costs Crew Work - Bovill, Idaho.

Chemical	Total Ribes Live Stem per Acre	Block No.	Acre-age	Man Spraying Hours per Acre	Man Spraying Hours per 1000' L.S.	Gallons of Chemical per Acre	Gallons of Chemical per 1000' L.S.	Chemical Cost per Acre	Chemical Cost per 1000' L.S.	Labor Cost per Acre	Labor Cost per 1000' L. S.	Total Cost* per Acre	Total Cost* per 1000' L. S.
$NaClO_3$ - 25%	9,100	I	22.3	17.7	1.90	62.1	6.82	11.80	1.29	9.03	0.99	$20.82	$2.28
$NaClO_3$ - 20%	11,490	II	6.9	14.8	1.30	61.7	5.37	9.38	0.82	7.54	0.66	$16.92	$1.48

*Above costs are for a six-man crew. Chemical cost 19¢ a gallon for $NaClO_3$ - 25% and 15.2¢ - 20%. Labor cost 51¢ per man spraying hour.

Comparison of Chemical Eradication Costs

	1925	1926	1927
Average per Acre	$59.10	$27.41	$20.82) for $NaClO_3$ - 25% $16.92) " " - 20%

Table No. 19

Chemical Treatments for Corn Borer - Dowell, Idaho.

Chemical	Total Dilute Value per Acre	Stock To.	Acre Yield	Cost per 1000 l.	Cost per A. Acre	Chemical Cost per Acre	Labor Cost per Acre	Total Cost per Acre
[illegible] - 40%	$ 3.50	1	72.4	17.2	1.20	24.1	2.00	11.00	1.20	3.20	0.00	24.10
[illegible] - 25%	11.00	11	6.4	14.4	1.80	25.7	2.00	2.00	0.80	2.80	0.00	21.40

*Above costs are for a six-man crew. Chemical cost 1.84 a gallon for [illegible] - 40% and 10.00 for [illegible] - 25%.

Labor cost $1.00 per man spraying hour.

Comparison of Chemical Treatments

Dilute	Cost	Kill	Cost
Nicotine Sulphate 40%	$ 3.50 per gal.	88.0%	$ 1.84 per acre
Lead Arsenate 25%	11.00 " "	72.4	2.00 " "

Summary of Work Done

(1). During the seasons of 1924 and 1925 three one-acre plots at Wallace, Idaho, and five one-acre plots at Santa, Idaho, were staked out. Data which were taken included height of Ribes bush, feet of live stem and feet of dead stem per bush. A crew of five men carried out the work on these areas. Chemicals were applied (1) as a spray (2) in solid form about the roots and crown (3) in saturated solution squirted on the soil at the base of the plant. A three-gallon hand-compressed sprayer was used and found to be satisfactory for the open type of country encountered.

(2). During the 1926 season data were carefully taken over all plots. New chemicals were tested on an additional one-acre area at Santa and fifteen acres of R. petiolare and G. inermis were eradicated. This latter work was done at Clarkia, Idaho, and special studies were made of equipment and crew working methods. A four-gallon knapsack sprayer was found to be most satisfactory for general crew work.

(3). Experimental work with new chemicals and crew spraying work were kept separate during the 1927 field season. Experimental work was carried out at Santa, Idaho, while a large area of R. petiolare, G. inermis has been eradicated at Bovill, Idaho, according to our best working methods.

The following is a list of chemicals tested, giving name, formulae, concentration and comment on their effectiveness:

Summary of Work Done

(1). During the seasons of 1924 and 1925 three one-acre plots at Wallace, Idaho, and five one-acre plots at Santa, Idaho, were staked out. Data which were taken included height of Ribes bush, feet of live stem and feet of dead stem per bush. A crew of five men carried out the work on these areas. Chemicals were applied (1) as a spray (2) in solid form about the roots and crown (3) in saturated solution squirted on the soil at the base of the plant. A three-gallon hand-compressed sprayer was used and found to be satisfactory for the open type of country encountered.

(2). During the 1926 season data were carefully taken over all plots. New chemicals were tested on an additional one-acre area at Santa and fifteen acres of R. petiolare and G. inermis were eradicated. This latter work was done at Clarkia, Idaho, and special studies were made of equipment and crew working methods. A four-gallon knapsack sprayer was found to be most satisfactory for general crew work.

(3). Experimental work with new chemicals and crew spraying work were kept separate during the 1927 field season. Experimental work was carried out at Santa, Idaho, while a large area of R. petiolare, G. inermis has been eradicated at Moyill, Idaho, according to our best working methods.

The following is a list of chemicals tested, giving name, formula, concentration and comment on their effectiveness:

Table No. 20

Observations of Chemical Action on Ribes

Name	Formulae	Concentration	Remarks
Oxalic acid	$(COOH)_2$	10%	Indeterminate. Has possibilities.
Manganese sulphate	$MnSO_4$	25%	Unfavorable.
Magnesium sulphate	$MgSO_4$	20%	"
Zinc sulphate	$ZnSO_4$	15%	"
Iron sulphate	$Fe_2(SO_4)_3$	10%	Indeterminate.
Calcium hypochlorite	$Ca(OCl)_2$	Solid	"
Calcium cyanide	$Ca(CN)_2$	"	"
Copper sulphate	$CuSO_4$	10-15%	Unfavorable.
Mercuric chloride	$HgCl_2$	1-2-5%	"
Lead acetate	$Pb(C_2H_3O_2)_2$	25%	"
Potassium ferrocyanide	$K_4Fe(CN)_6$	10-15%	"
Potassium cyanide	KCN	15%	Indeterminate.
Chromic acid	H_2CrO_4	10%	Unfavorable.
Phenol	C_6H_5OH	5-10%	"
Tannic acid	$C_{14}H_{10}O_9$	10%	"
Sodium chlorate	$NaClO_3$	25%	Favorable. This solution has been used with the following spreaders: Fish Oil Soap 0.1% (best). Glue 0.1%. Linseed Oil 1%. Calcium caseinate 2%.
Sodium chlorate and calcium chloride	$NaClO_3$ $CaCl_2$	25% 6%	Favorable. Not quite as good as $NaClO_3$ alone.
Sodium chlorate and sodium hydroxide	$NaClO_3$ NaOH	25% 2%	Favorable. Not as good as $NaClO_3$.
Sodium chlorate and acetic acid	$NaClO_3$ $C_2H_4O_2$	25% 2%	Indeterminate. Applied this year.
Sodium chlorate and ammonium chloride	$NaClO_3$ NH_4Cl	25% 20%	" " " "
Potassium chlorate	$KClO_3$	5% 25%	Favorable. Not as effective as $NaClO_3$.
Sodium chloride	NaCl	Also solid	Unfavorable.
Sodium bromide	NaBr	15%	"
Sodium fluoride	NaF	4%	Indeterminate.
Sodium tetraborate	$Na_2B_4O_7$	10%	Unfavorable.
Ammonium chloride	NH_4Cl	25%	Favorable. Probably our best on G.inermis.
Ammonium carbonate	$(NH_4)_2CO_3$	20%	Unfavorable.
Ammonium dischromate	$(NH_4)_2Cr_2O_7$	2%	Indeterminate.
Ammonium bromide	NH_4Br	10%	"
Ammonium fluoride	NH_4F	8-10%	Favorable.
Ammonium nitrate	NH_4NO_3	10-15%	Unfavorable.
Ammonium persulphate	$NH_4S_2O_8$	15-25%	Favorable. Action like $NaClO_3$
Potassium fluoride	KF	4%	Indeterminate.
Calcium chloride	$CaCl_2$	5-10-20%	Unfavorable.
Barium chloride	$BaCl_2$	10%	"
Sodium hydroxide	NaOH	2-4%	"
Kerosene	---	100%	Favorable.
Ferrous oxide	FeO	3%	Unfavorable.
Sodium dischromate	$Na_2Cr_2O_7$	15%	Indeterminate.
Zinc chloride	$ZnCl_2$	10%	"
Aluminium sulphate	$Al_2(SO_4)_3$		"
Sodium fluoride and sodium hydroxide	NaF NaOH	4% 2%	Unfavorable.
Perchloric acid	$HClO_4$	1-2%	Indeterminate

1927 Annual Report
E. R. Offord

Our best working unit so far is a crew of six men consisting of (a) a foreman who runs in string lines and blocks out the work ahead of the crew, makes up spray solutions and keeps chemical and equipment up with the crew and whenever possible checks behind the crew, (b) an assistant foreman who works right in the crew line and who supervises most of the actual spraying, (c) four crewmen who carry the heavy part of the spraying job.

The best results to date from these experiments have been obtained by the use of a spray solution of sodium chlorate, $NaClO_3$, 25% by weight, which killed 96.3% of R. petiolare.

Fish oil soap (0.1% of the dry weight of $NaClO_3$ used) was found to be the most satisfactory sticker. Sodium chlorate spray after drying on the foliage is highly inflammable. Addition of calcium chloride or ammonium chloride (25% of the dry weight of $NaClO_3$ used,) reduces the inflammability hazard somewhat but partially destroys the effectiveness of $NaClO_3$ as a Ribes killer. Further consideration of this important point is being given.

Field and laboratory experimental work is incomplete but results appear to indicate:-

Concluded from Field Experiments

(1) that, R. petiolare can be killed by one application of the spray to the aerial parts.

(2) that, Ribes of moist habitat are more susceptible than Ribes of dry situation, but a marked difference in susceptibility to $NaClO_3$ occurs between R. petiolare and G. inermis which are both of damp habitat.

(3) that, best results are obtained by applying chemicals early in the growing season. A period of warm dry weather with a slight fall of dew in the evening and early morning seems to provide ideal conditions for the action of the chemical.

Concluded from Laboratory Experiments.

(4) that, absorption of the chlorate, if any, is small in magnitude and probably local in nature.

(5) that, the amount of halogen present in Ribes tissue after treatment with $NaClO_3$ is greatest under optimum conditions of moisture and light. This also holds good for the $KBrO_3$.

(6) that, no increase is observed in the halogen content of the

Our best working unit so far is a crew of six men consisting of (a) a foreman who runs in string lines and blocks out the work ahead of the crew, makes up spray solutions and keeps chemical and equipment up with the crew and whenever possible checks behind the crew, (b) an assistant foreman who works right in the crew line and who supervises most of the actual spraying, (c) four crewmen who carry the heavy part of the spraying job.

The best results to date from these experiments have been obtained by the use of a spray solution of sodium chlorate, $NaClO_3$, 25% by weight, which killed 96.3% of R. petiolare.

Fish oil soap (0.1% of the dry weight of $NaClO_3$ used) was found to be the most satisfactory sticker. Sodium chlorate spray after drying on the foliage is highly inflammable. Addition of calcium chloride or ammonium chloride (25% of the dry weight of $NaClO_3$ used,) reduces the inflammability hazard somewhat but partially destroys the effectiveness of $NaClO_3$ as a Ribes killer. Further consideration of this important point is being given.

Field and laboratory experimental work is incomplete but results appear to indicate:-

Concluded from Field Experiments

(1) that, R. petiolare can be killed by one application of the spray to the aerial parts.

(2) that, Ribes of moist habitat are more susceptible than Ribes of dry situation, but a marked difference in susceptibility to $NaClO_3$ occurs between R. petiolare and G. inermis which are both of damp habitat.

(3) that, best results are obtained by applying chemicals early in the growing season. A period of warm dry weather with a slight fall of dew in the evening and early morning seems to provide ideal conditions for the action of the chemical.

Concluded from Laboratory Experiments.

(4) that, absorption of the chlorate, if any, is small in magnitude and probably local in nature.

(5) that, the amount of halogen present in Ribes tissue after treatment with $NaClO_3$ is greatest under optimum conditions of moisture and light. This also holds good for the $KBrO_3$.

(6) that, no increase in observed in the halogen content of the

roots after application of chlorate to the aerial parts of Ribes.

(7) that, the action of $NaClO_3$ is much faster on Ribes placed outside in full sunlight than on greenhouse plants where a partial exclusion of the ultra-violet end of the spectrum occurs.

(8) that, the action of $NaClO_3$ is much greater on plant tissue when the Ribes are kept so that all cells are in a turgid condition.

(9) that, action is more rapid when the chlorate is applied to the lower leaf-surface than when it is applied to the upper surface.

(10) that, the toxic action of sodium chlorate is due to the liberation of nascent oxygen under ultra-violet action of the sun.

R. petiolare is being eradicated in Idaho with this chemical by crews of men provided with four-gallon knapsack sprayers. It is planned to take over most of this work with small portable power sprayers which have been built and which are now being tested out. See report of P. B. Bell for details of crew management with hand sprayers and power sprayers.

Results on R. petiolare are very encouraging and we can now state that R. petiolare can be more cheaply and effectively eradicated by means of sodium chlorate than by hand pulling methods. G. inermis still presents a problem, but a fundamental understanding of the action of sodium chlorate on R. petiolare will doubtless help us in solving the G. inermis difficulty. It is expected that with the development of power spraying methods, will come a material decrease in our costs per acre, which costs at present represent a definite saving over hand eradication for very heavily concentrated areas.

roots after applications of chlorate to the aerial parts of Ribes.

(7) that, the action of $MnCl_2O_8$ is much faster on Ribes placed outside in full sunlight than on greenhouse plants where a partial exclusion of the ultra-violet end of the spectrum occurs.

(8) that, the action of $MnCl_2O_8$ is much greater on plant tissue when the Ribes are kept so that all cells are in a turgid condition.

(9) that, action is more rapid when the chlorate is applied to the lower leaf-surface than when it is applied to the upper surface.

(10) that, the toxic action of sodium chlorate is due to the liberation of nascent oxygen under ultra-violet action of the sun.

B. petiolare is being eradicated in Idaho with this chemical by crews of men provided with four gallon Chapman sprayers. It is planned to take over most of this work with small portable power sprayers which have been built and which are now being tested out. See report of P. B. Bell for details of crew management with hand sprayers and power sprayers.

Recent tests on B. petiolare are very encouraging and we can now state that B. petiolare can be more cheaply and effectively eradicated by means of sodium chlorate than by hand pulling methods. G. inermis still presents a problem, but a fundamental understanding of the action of sodium chlorate on B. petiolare will doubtless help us in solving the G. inermis difficulty. It is expected that with the development of power spraying methods, will come a material decrease in our costs per acre, which costs at present represent a definite saving over hand eradication for very heavily concentrated areas.

Section III

CHEMICAL ERADICATION CREW MANAGEMENT

By
Percy B. Bell,
Agent.

A. Working Plan Used on Bovill, Idaho Area

I. Equipment Used:

(a) Sprayer used was the D. B. Smith and Company knapsack sprayer, consisting of a 5-gallon tank with a curve to fit the back, a "Stariy Pump" fitted with a No. 3 nozzle and a rubber hose to connect pump to tank. (See D. B. Smith & Company Catalog No. 40).

(b) Other equipment consisted of three 15-gallon boilers or tubs, large wooden paddles for mixing solution, tin funnels, gallon measures, and general camp equipment.

II. Spray Used:

(a) Block I, section 1, $NaClO_3$ 25%

(b) Block I, section 2, $NaClO_3$ 25% + whale oil soap 0.1%

(c) Block II, section 1, $NaClO_3$ 25% + Glue 0.1%

(d) Block II, section 2, $NaClO_3$ 20%

III. Personnel of Unit:

(a) Foreman who was in complete charge of unit.

(b) Assistant foreman who was appointed each day by the foreman since all crew men were inexperienced. He was one of the spraying crew and did the same work as other members of the crew except that he was responsible for the actions of the crew that day during times when the foreman was absent.

(c) Four crew men who with the assistant foreman did the actual spraying. (This six-man unit was found to be the most efficient crew for knapsack spraying.)

IV. Laying out Area for Spraying:

(a) Blocking off and mapping. The area chosen was on the East Fork of Potlatch Creek from Frye Meadow to Winton Logging Camp No. 4, (camp now abandoned).

N.679. Bovill, Idaho. Upper end of [illegible] centration of brush. Typical [illegible] chemical methods.

Section III.

Spray Equipment and Material.

I. Equipment Used:

(a) Sprayer used was the D. B. Smith and Company knapsack sprayer, consisting of a 5-gallon tank with a curve to fit the back, a "Steady Pump" fitted with a No. 5 mec-le and a rubber hose to connect pump to tank. (See D. B. Smith & Company Catalog No. 40).

(b) Other equipment consisted of three 15-gallon buckets or tubs, large wooden paddles for mixing solution, tin funnels, gallon measures, and general camp equipment.

II. Spray Used:

(a) Block I, section 1, $NaClO_3$ 50% + whale oil soap 0.1%

(b) Block I, section 2, $NaClO_3$ 50% + whale oil soap 0.1%

(c) Block II, section 1, $NaClO_3$ 50% + Dyne 0.1%

(d) Block II, section 2, $NaClO_3$ 50%

III. Personnel of Unit:

(a) Foreman who was in complete charge of unit.

(b) Assistant foreman who was appointed each day by the foreman since all crew men were inexperienced. He was one of the spraying crew and did the same work as other members of the crew except that he was responsible for the actions of the crew that day during times when the foreman was absent.

(c) Four crew men who with the assistant foreman did the actual spraying. (This six-man unit was found to be the most efficient crew for knapsack spraying.)

IV. Laying out Area for Spraying:

(a) Blocking off and marking. The area chosen was on the West Fork of Potlatch Creek from Pine Meadow to Winton Logging Camp No. 4, (camp now abandoned).



W.115. Bovill, Idaho. Alluvial valley at mouth of Robs Creek. Note R. petiolare along sides of stream.



W.679. Bovill, Idaho. Upper end of Block 2, Chemical Erad. plots. Note concentration of brush. Typical of alluvial bottom land that must be worked by chemical methods.

The area was blocked off in 1/4 mile blocks by compass strips beginning at an old log shed at head of Frye Meadow and ending near Winton Camp. A traverse map of this area was made. (See maps enclosed with this report).

(b) When ready to begin actual spraying, parallel strips in the majority of cases were laid out approximately at right angles to the drainage by the foreman. These strips were .5 chains wide and marked by means of string lines. By pacing the length of each strip was determined from which the acreage was computed and recorded.

In some cases it was found to be more convenient to lay out strips parallel to the drainage. This was especially true when the creek came quite close to the boundary lines or roads from which the work was being done.

V. Handling Unit over Area;

(a) Preliminary preparations. While the parallel strips were being laid out, the crew prepared solution for spraying, repaired any defective equipment, and made any other adjustments necessary for actual spraying.

The solution necessarily had to be made up near the creek, consequently spraying on the strips was begun at the creek.

(b) The tanks were filled with solution by means of a gallon measure and a funnel. In this way, the solution was measured as the tanks were filled. The solution was all strained through a double thickness of cheesecloth during this same process.

(c) Spraying was done with a five-man crew moving abreast taking the width of one strip (.5 chain). Thus each man was responsible for a strip less than seven feet wide or three and one half feet on each side of him. With this width of a strip he could thoroughly spray each leaf and stem of the Ribes bushes of his area.

If the concentration of Ribes and length of strip allowed, the crew tried to make one complete round (two strips) before refilling tanks. Otherwise the crew sprayed until their solution was nearly gone. On leaving a strip to refill, they generally stopped spraying at a place which formed a natural boundary so that they did not miss any Ribes when they returned.

If, due to varying concentrations of Ribes on different parts of the strip being sprayed, one man ran out of spray before the rest, the other men would each take a little wider strip and go a little slower in order

The area was blocked off in 1/4 mile blocks by compass strips beginning at an old log shed at head of Frye Meadow and ending near Winton Camp. A traverse map of this area was made. (See maps enclosed with this report).

(b) When ready to begin actual spraying, parallel strips in the majority of cases were laid out approximately at right angles to the drainage by the foreman. These strips were .5 chains wide and marked by means of string lines. By pacing the length of each strip was determined from which the acreage was computed and recorded.

In some cases it was found to be more convenient to lay out strips parallel to the drainage. This was especially true when the creek came quite close to the boundary lines or roads from which the work was being done.

V. Handling Unit over Area:

(a) Preliminary preparations. While the parallel strips were being laid out, the crew prepared solution for spraying, repaired any defective equipment, and made any other adjustments necessary for actual spraying.

The solution necessarily had to be made up near the creek, consequently spraying on the strips was begun at the creek.

(b) The tanks were filled with solution by means of a gallon measure and a funnel. In this way, the solution was measured as the tanks were filled. The solution was all strained through a double thickness of cheesecloth during this same process.

(c) Spraying was done with a five-man crew moving abreast taking the width of one strip (.5 chain). Thus each man was responsible for a strip less than seven feet wide or three and one half feet on each side of him. With this width of a strip he could thoroughly spray each leaf and stem of the Ribes bushes of his area.

If the concentration of Ribes and length of strip allowed, the crew tried to make one complete round (two strips) before refilling tanks. Otherwise the crew sprayed until their solution was nearly gone. In leaving a strip to refill, they generally stopped spraying at a place which formed a natural boundary so that they did not miss any Ribes when they returned.

If, due to varying concentrations of Ribes on different parts of the strip being sprayed, one man ran out of spray before the rest, the other men would each take a little wider strip and go a little slower in order

to cover the whole width of the strip. This enabled the spraying line to keep moving forward while he returned to the filling station to get more solution.

If two or more men ran out of solution before the rest, it was found preferable to have the whole crew return and refill, or for those not out of solution to remain where they were until the rest returned. In this way, there was no misunderstanding as to which bushes had been sprayed and which had not.

In spraying it was found best to keep very nearly a straight line formation even at the cost of one man having to be idle while waiting for the rest to catch up. For if one man left his place to help someone else in his territory, the one being helped often would think the other person had sprayed a certain portion of a large clump and would leave it unsprayed. In this way, it was found that the Ribes were not all sprayed.

It has been found unnecessary and impractical to have the crew foreman checking behind the crew all of the time. For the first few days until each member of the crew became very familiar with each species of Ribes present, the foreman checked very closely on most of the strips worked, but after they had developed an eye for Ribes, the foreman did not have to check more than one-eighth of the time. Checking by the foreman at all times was impractical:

(1) Because the distance between men was not so great but what all Ribes were readily seen even in very thick brush.

(2) Because the foreman knocked more or less of the spray from the Ribes thus decreasing the efficiency of the spray.

(3) Because the foreman's time was needed for other work.

The only need for checking by the foreman was to see that the men did not become careless in spraying too heavily, thus wasting solution, or in spraying too lightly, thus getting a poor kill.

During the time thus given to the foreman he was keeping records, cutting trails, mixing solutions, keeping up the supply of dry chemical, moving filling stations, and laying out strips.

Records were kept on regular Daily Crew Record forms for Chemical Eradication. Besides this, notes were taken on any special difficulties encountered and also on method suggestions offered by the crew.

Trails along the creek and from roads to creek were found to be indispensable. Most of these were made by the foreman. Trails saved considerable time for the crew men on coming back to refill tanks and

considerable time for the crew men on coming back to refill tanks and
tridges. Most of these were made by the foreman. Trails saved
Trails along the creek and from roads to areas were found to be

Records were kept on regular Daily Crew Record forms for Chemical
fication. Besides this, notes were taken on any special difficul-
ties encountered and also on noted suggestions offered by the crew.

Mixing solutions, keeping up the supply of dry chemi-
cal, moving fillers stations, and laying out strips.
cutting trail, During the time given to the foreman he was keeping records,

or in spraying too lightly, thus getting a poor kill.
did not become careless in spraying too heavily, thus wasting solution,
The only need for checking by the foreman was to see that the men

(3) Because the foreman's time was needed for other work.

the Ribes thus decreasing the efficiency of the spray.

(2) Because the foreman knocked more or less of the spray from

(1) Because the distance between men was not so great but what
all Ribes were readily seen even in very thick brush.

not have to check more than one-eighth of the time. Checking by the
foreman at all times was impractical:
worked, but after they had developed an eye for Ribes, the foreman did
or Ribes present, the foreman checked very closely on most of the strips
days until each member of the crew became very familiar with each species
foreman checking behind the crew all of the time. For the first few

It has been found unnecessary and impractical to have the crew

leave it unsprayed. In this way, it was found that the Ribes were not
other person had sprayed a certain portion of a large clump and would
one else in his territory, the one being helped often would think the
for the next to catch up. For if one man left his place to help some-
formation even at the cost of one man having to be idle while waiting

In spraying it was found best to keep very nearly a straight line

sprayed and which had not. In this manner, it was determined from which
not out of solution they were returned until the rest returned.
found preferable to have the whole crew return and refill, or for those
If two or more men ran out of solution before the rest, it was

more solution.
to keep moving forward while he returned to the filling station to get
to cover the whole width of the strip. This enabled the spraying line

for the foreman in getting the dry chemical to the filling station.

The method of mixing solutions was as follows: Two copper boilers capacity 15 gallons each, and 1 washtub, capacity 16 gallons, were used. $NaClO_3$ was weighed out in 32-pound lots. For weighing it was found most convenient to use a large galvanized bucket and a 50-pound capacity spring scale. After each lot was weighed out, the chemical was placed in a cotton flour sack as the most convenient means of carrying it to the filling station. One 32-pound lot was dumped into each boiler and 12 gallons of water added and thoroughly stirred with large wooden paddles. When cold water from the creek was used, the $NaClO_3$ took some time to dissolve. This was considerably hastened by continual stirring.

The foreman did most of this work after spraying operations on any one block got well under way.

A filling station is defined as that place chosen for the mixing of solutions, and hence the place the tanks were brought to be refilled.

The foreman while cutting trails selected places along the creek most convenient to the area being sprayed so that the least possible amount of time was consumed by the crew men in actual traveling back to the filling station when their tanks were empty. These filling stations were located on an average of about 3 chains apart along the creek. It was necessary for the foreman to watch the spraying and to determine how much solution would be necessary to spray all Ribes half way to the next filling station. As soon as enough solution was mixed at that station and one container was emptied, it was taken to the next station where more spray was mixed up. In this way a negligible amount of time was taken from actual spraying time for the moving of equipment from one station to another.

The general method for laying out the area was described in section IV of this report.

In laying out the strips therein described a compass was used to get the lines as nearly parallel as possible. The foreman laid out enough string lines ahead of the crew to keep the crew busy approximately one-half day. In this way, the crew did not have to wait for the area to be laid out except at the beginning of the first block. The length of the strips were measured by pacing while laying the string lines.

VI. Suggested Improvements in Equipment:

(a) Something should be done to see if the ridge which holds the bottom of the tank to the sides can be removed by some different method of welding, such as used on last year's tank.

(b) Mr. Ross suggested that a piece of canvas might be laced tightly around spray tanks, thus forming a cushion so that the tank will ride

for the foreman in getting the dry chemical to the filling station.



W.693. The start of the day's work. Removing chemical from kegs, weighing it.



W.671. Charging chemical into knapsack sprayers after solution has taken place.



W. 672. The crew loading up with a charge of chemical.



W. 687. Another view of the crew at work.

easier on the back.

(c) The shoulder strap rings on the bottom of the tanks should be set farther apart.

(d) Shoulder straps should be a little wider.

B. Working Plan Used With Power Equipment

I. Equipment Used:

(a) Pumpers.

(1) Pacific marine pumper consisted of 1-1/2-H.P., air-cooled, one cylinder gasoline motor, mounted on a base with a standard Oberdorfer type A, form YZ#9 single stage pump, of bronze construction. The gas tank was mounted overhead and the dry cell batteries were in a separate box. The pump was equipped with an adjustable by-pass in order to equalize the pressure regardless of the number of nozzles which were open. The pressure was maintained between 75 and 90 pounds.

The whole unit including the battery weighed a little over fifty pounds.

(2) The Ross pumper was a modification of the Ross Fire-fighter, and consisted of a 4-horsepower, 2-cylinder, thermosyphon cooled, gasoline motor mounted on a base with a specially designed double stage gear pump of monel metal construction.

The battery was a standard 6 volt water-proof, dry-cell, concealed with the gas tank in the base which is of light but strong metal construction.

The pump was equipped with an adjustable by-pass so that a constant pressure between 175 and 200 pounds was maintained. The weight of this unit was 96 pounds complete.

(b) Other equipment.

Fifty feet of 1" heavy canvas hose. (This was found to be inadequate to handle pressures obtained by the Ross pumper). One hundred feet of 1" pressure rubber hose. (This was found to be too cumbersome and unnecessary even for main line). One hundred feet of 1/2" pressure rubber hose which was used in all later experiments as main line. Three hundred feet of 3/8" and 100 feet of 1/4" pressure rubber hose which was used as laterals in four sections, 100 feet to the section with a nozzle on the end of each section.

The nozzles first used were Vermorel type of spray nozzle, but later was exchanged for a combination of that type and the extensions

(e) The shoulder strap rings on the bottom of the tanks should be set farther apart.

(d) Short ter straps should be a little wider.

B. Working Plan Used With Power Equipment

1. Equipment Used:

(a) Pumpers.

(1) Pacific marine pumper consisted of 1- 1/2-H.P., air-cooled, one cylinder gasoline motor, mounted on a base with a standard Oberdorfer type A, form 72#3 single stage pump, of bronze construction.

The gas tank was mounted overhead and the dry cell batteries were in a separate box. The pump was equipped with an adjustable by-pass in order to equalize the pressure regardless of the number of nozzles which were open. The pressure was maintained between 75 and 90 pounds.

The whole unit including the battery weighed a little over fifty pounds.

(2) The Rose pumper was a modification of the Rose Fire-fighter, and consisted of a 4-horsepower, 2-cylinder, thermosyphon cooled, gasoline motor mounted on a base with a specially designed double stage gear pump of monel metal construction.

The battery was a standard 6 volt water-proof, dry-cell, concealed with the gas tank in the base which is of light but strong metal construction.

The pump was equipped with an adjustable by-pass so that a constant pressure between 175 and 200 pounds was maintained. The weight of this unit was 95 pounds complete.

(b) Other equipment.

Fifty feet of 1" heavy canvas hose. (This was found to be inadequate to handle pressures obtained by the Rose pumper). One hundred feet of 1" pressure rubber hose. (This was found to be too cumbersome and unnecessary even for main line). One hundred feet of 1/2" pressure rubber hose was used in all later experiments as main line. Three

and nozzles used in hand spraying.

Two copper wash boilers, one galvanized tub, pails, gallon measures, and tools necessary for handling the power equipment made the balance of the equipment.

II. The spray used for these experiments was water.

III. Personnel of Unit:

(a) The foreman was in charge of whole unit and also laid out the area to be sprayed, helped keep the hose lines straight and move equipment, and kept records.

(b) The mechanic ran the motors, kept the tank filled with spray, helped move equipment and pick sites for pumping stations.

(c) Four crew men did actual spraying and helped move equipment.

IV. Laying out Area for Spraying:

(a) The plots on Merry Creek, Clarkia, Idaho, were chosen for this experimental power spraying for the following reasons:

(1) The first two blocks had been sprayed with hand sprayers the year before and interesting as well as valuable comparisons could be made. The chemical that had been used the year before had not been effective enough to make any difference in the actual spraying data.

(2). Good facilities were available for meals and lodging.

(3). This area was about as difficult as any that will be run up against in future eradication.

(4). This area had already been blocked off in 1/8 mile blocks.

(b) Methods used for laying out strips:

(1). Parallel strips 50 ft. wide were laid out perpendicular to the drainage by the foreman using strings as boundaries.

(2). Where just a narrow strip along the creek had to be sprayed the strips were laid parallel to the creek.

(3). On wider drainages the best system of laying out area was worked out the last day of work at Clarkia, Idaho. This consists of laying out strips 3 chains wide perpendicular to the drainage, then sub-dividing into 3/4 chains strips parallel to the creek as in the following diagram:

and supplies used in hand spraying.

Two copper wash boilers, one galvanized tub, pails, gallon measures, and tools necessary for handling the power equipment made the balance of the equipment.

II. The entry used for these experiments was with:

III. Personnel of Unit:

(a) The foreman was in charge of whole unit and also laid out the area to be sprayed, helped keep the hose lines straight and move equipment, and kept records.

(b) The mechanic ran the motors, kept the tank filled with spray, helped move equipment and pick sites for pumping stations.

(c) Four crew men did actual spraying and helped move equipment.

II. Service and Area for Spraying:

(a) The plots on Merry Creek, Clarkia, Idaho, were chosen for this experimental power spraying for the following reasons:

(1). The first two blocks had been sprayed with hand sprayers the year before and interesting as well as valuable comparisons could be made. The chemical that had been used the year before had not been effective enough to make any difference in the actual spraying data.

(2). Good facilities were available for meals and lodging.

(3). This area was about as difficult as any that will be run up against in future eradication.

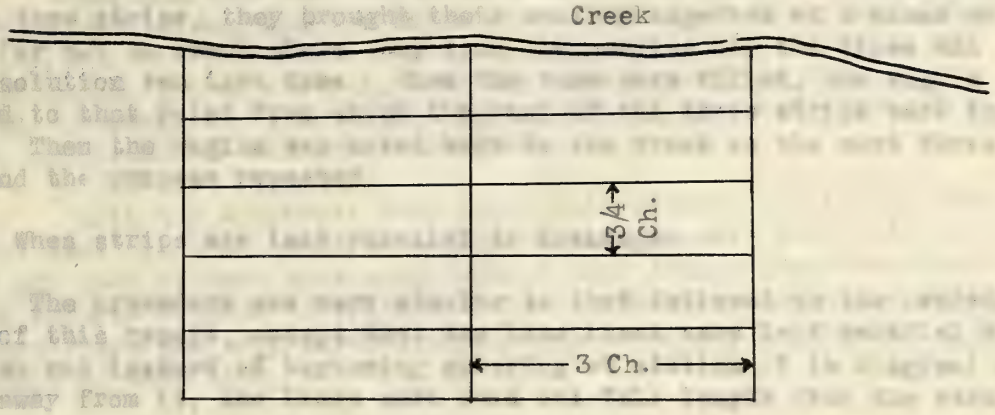
(4). This area had already been blocked off in 1/8 mile blocks.

(b) Methods used for laying out strips:

(1). Parallel strips 50 ft. wide were laid out perpendicular to the drainage by the foreman, using strings as boundaries.

(2). Where just a narrow strip along the creek had to be sprayed the strips were laid parallel to the creek.

(3). On wider drainages the best system of laying out area was working out the last lay of work at Clarkia, Idaho. This consists of laying out strips 5 chains wide perpendicular to the drainage, then sub-dividing into 3\4 chains strips parallel to the creek as in the following diagram:



V. Handling Unit over Area:

(a) When strips are laid out perpendicular to the drainage:

The pumping station was set up on the creek near the center boundary dividing two strips. The foreman laid out 100 ft. of main line from the engine, placing the "T" in the center of strip No. 1, then each crew man brought his 100 ft. of lateral hose to the "T" where it was coupled on the main line. At the "T", the crew men took their lateral and went into the crew where they began spraying after the mechanic had been notified that all was in readiness and had begun the pumper.

Each crew man started backing up, and pulled his hose line after him. He did not stop at the "T" but continued until the extremity of the strip or the end of the hose line had been reached.

The crew as a whole, worked as nearly abreast in line formation as the brush conditions would permit, and since the strips were laid out about 66 feet (.75 chains) wide, each man was responsible for about 6 feet on each side of him.

When the end of the strip had been reached, the crew foreman signaled to the mechanic who stopped the pumper. The foreman then uncoupled the laterals and moved the "T" to center of strip No. 2 which was worked in the same manner as strip No. 1. In this way, 2 strips were sprayed before the engine had to be moved. When the strips were short, three could be worked before moving the engine. Since only 100 feet of main line were available, it is obvious that the longest strip which could be worked by this system was 200 feet.

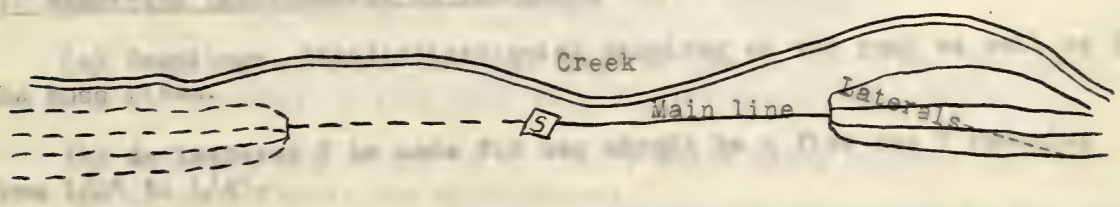
For longer strips than this, a relaying system was used which is as follows:

Creek
3 Ch.

After the crew men had sprayed as far as the hose lines would allow on thru strips, they brought their nozzles together at a place convenient for all to reach where they took the nozzles off the lines and let the solution run into tubs. When the tubs were filled, the engine was moved to that point from which the rest of the three strips were then sprayed. Then the engine was moved back to the creek on the next three strips and the process repeated.

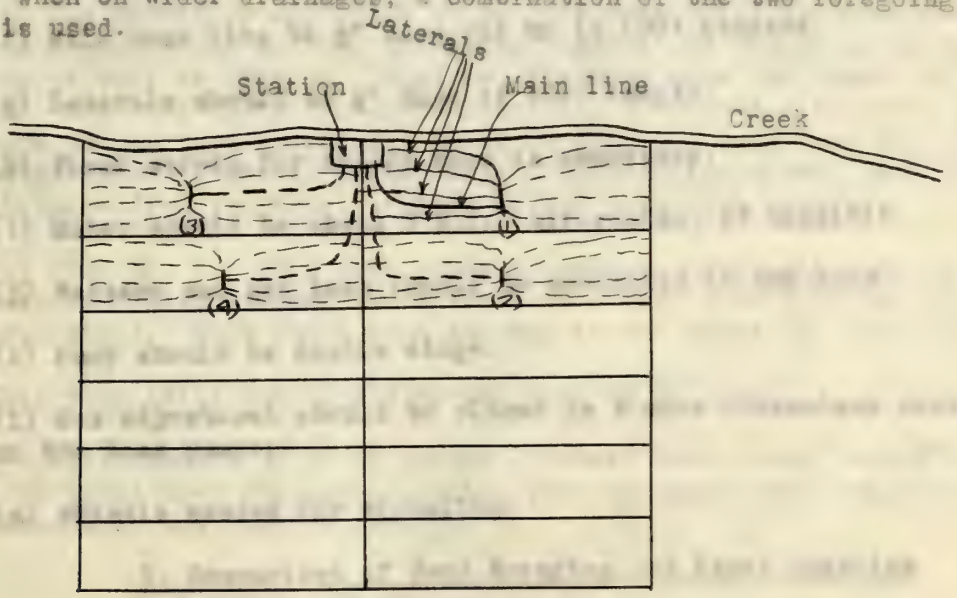
(b) When strips are laid parallel to drainage:

The procedure was very similar to that followed in the preceding portion of this report, except that the hose lines were laid parallel to the stream and instead of beginning spraying at station (S in diagram) and working away from it, the lines were laid out full length from the station



on one side where spraying was begun and everything sprayed up to the station. Then the main line was moved to the other side and spraying begun at the station and continued until the ends of the hose lines were reached. In this way, a maximum strip of 700 feet in length could be sprayed without changing filling stations.

(c) When on wider drainages, a combination of the two foregoing methods is used.



(b) When strips are laid parallel to drainage:

The procedure was very similar to that followed in the preceding portion of this report, except that the hose lines were laid parallel to the stream and instead of beginning spraying at station (S in diagram) and working away from it, the lines were laid out full length from the station on one side where spraying was begun and everything sprayed up to the station. Then the main line was moved to the other side and spraying begun at the station and continued until the ends of the hose lines were reached. In this way, a maximum strip of 700 feet in length could be sprayed without changing filling stations.

(c) When on wider drainage, a combination of the two foregoing methods is used.

The area was laid out in strips as diagramed and the pumping station located between two large areas. The hose lines were laid out as position (1) indicates. Spraying was begun at the station and continued to the end of strip 1, then the hose lines were moved to position (2) in strip 2. After spraying that strip the hose lines were moved to positions (3) and (4) successively.

With the equipment used last field season, two strips from the creek were all that could be worked in that manner, but it is obvious that if 500 feet of main hose were used, 8 or 9 strips from the creek could be sprayed without relaying the water. There are very few drainages where Ribes are very concentrated, that could not be reached with that length of main line.

VI. Suggested improvements on equipment

(a) Couplings, Standardized-quick coupling on the pump as well as on the hose lines.

(b) An improved T be made for use should be a five-way T reducing from 1/2" to 1/4".

(c) An improved nozzle should be light, strong, fitted with a trigger valve, and 24" extension. Nozzle should have a finer hole.

(d) A suitable stretcher should be made for carrying pumping units.

(e) Substantial tool box be made with handles for carrying.

(f) Main hose line be ½" hose put up in 100' lengths.

(g) Laterals should be ¼" hose of 100' length.

(h) Finer screen for intake hose is necessary.

(i) Motor should be about 3 H.P., air-cooled, if possible.

(j) Battery and gas tank should be concealed in the base.

(k) Pump should be double stage.

(l) Gas adjustment should be placed in a more convenient position than that on the Ross pumper.

(m) Whistle needed for signaling.

C. Comparison of Hand Spraying and Power Spraying

I. Points in favor of hand spraying.

With the equipment used last field season, two strips from the creek were all that could be worked in that manner, but it is obvious that if 500 feet of main hose were used, 8 or 9 strips from the creek could be sprayed without relaying the water. There are very few places where flies are very concentrated, that would not be reached with that length of main line.

II. Suggested improvements on equipment

(a) Centrifuge, flow-control-valve governing on the base to be set to the hose lines.

(b) An improved T be made for use should be a five-way T reducing from 1½" to 1".

(c) An improved nozzle should be light, strong, fitted with a trigger valve, and 24" extension. Nozzle should have a finer hole.

(d) A suitable envelope should be made for carrying pumping units.

(e) Substantial tool box be made with handles for carrying.

(f) Main hose line be ¾" hose put up in 100' lengths.

(g) Laterals should be ½" hose of 100' length.

(h) Fiber valves for nozzle hose as necessary.

(i) Motor should be about 2 H.P., air-cooled, if possible.

(j) Battery and gas tank should be connected in the base.

(k) Pump should be double stage.

(l) One adjustment should be placed in a more convenient position than at the hose bumper.

(m) Handle needed for starting.

I. Points in favor of hand sprayer.

(a) Not much time wasted in handling equipment.

(b) Less solution wasted.

(c) Easier to spray the patches of Ribes when scattered and to spray small patches quite a distance from the creek.

(d) Less total weight in unit to be transferred from one place to another.

II. Points in favor of power spraying

(a) Total time to spray a concentrated area less than that taken by hand sprayers.

(b) Crew men carry no extra weight while spraying.

(c) Crew men more apt to stoop over to search for Ribes low under the brush. Tendency to take more care because weight is removed.

(d) Crew men not so apt to willfully waste spray because they have no special incentive to use up solution.

(e) Heavy concentration can be sprayed nearly as rapidly as the scattering patches.

III. Possible working plans for 1928 using a combination of hand and power spraying.

(a) The territory will have to be gone over quite thoroughly before the crew begins work, and the territory blocked off according to the means by which it will be sprayed. That is, the area near the creek and especially the very heavy concentrations will be worked with power sprayers while the patchy type especially those at some distance from the creek, and the isolated clumps of quite heavy concentration either near or at some distance from the creek will be worked with hand sprayers.

(b) Plan No. 1. This plan would be used in drainages such as the East Fork of Potlatch Creek where there is a very wide alluvial bottom with many Ribes. This would mean staying in one place for some time.

This plan calls for an eleven-man crew as follows:

(1) Foreman to be in charge of whole unit, camp and all equipment. He would keep the camp supplied with equipment and chemical. He would also keep and analyze records.

(a) Not more time wasted in handling equipment.

(b) Less scrubbing required.

(c) Easier to spray the valleys of hikes when scattered and to spray small patches quite a distance from the creek.

(d) Less total weight in units to be transferred from one place to another.

II. Points in favor of power spraying

(a) Total time to spray a concentrated area less than that taken by hand sprayers.

(b) Crew men carry no extra weight while spraying.

(c) Crew men more apt to stoop over to search for ripes low under the brush. Tendency to take more care because weight is removed.

(d) Crew men not so apt to willfully waste spray because they have no actual incentive to use up solution.

(e) Heavy concentration can be sprayed nearly as rapidly as the scattering patches.

III. Possible spraying plans for just doing a combination of head and tower spraying.

(a) The territory will have to be gone over quite thoroughly before the crew begins work, and the territory blocked off according to the means by which it will be sprayed. That is, the area near the creek and especially the very heavy concentrations will be worked with power sprayers while the patchy type especially those at some distance from the creek, and the isolated clumps of quite heavy concentration either near or at some distance from the creek will be worked with hand sprayers.

(b) Plan No. 1. This plan would be used in drainages such as the East Fork of Potlatch Creek where there is a very wide alluvial bottom with many Ripes. This would mean staying in one place for some time.

This plan calls for an eleven-man crew as follows:

(1) Foreman to be in charge of whole unit, camp, and all equipment. He would keep the camp supplied with equipment and [illegible]. He would also keep and analyze records.

(2) Assistant foreman to be in charge of power unit who helps to move and keep hose lines straight, keeps crew records, and lays out territory for spraying.

(3) Assistant foreman to be in charge of hand spraying. He would be one of the spraying crew when not occupied laying out the area and keeping records.

(4) A mechanic to look after the care and running of the pumping unit as well as mixing up solutions to keep the pump supplied.

(5) Crew men.

(a) Five men to handle hose lines and to do the actual spraying.

(b) Two men to spray with hand sprayers.

This plan calls for the unit to be equipped with ten hand sprayers so that in case of engine trouble, the hand sprayers could be used by the whole crew.

(c) Plan No. 2. This plan would be used on areas such as are found on the South Fork of Reed's Creek where heavy concentrations of Ribes just fringe the actual streams with scattering Ribes on the side streams.

This plan calls for a seven-man unit as follows:

(1) Foreman to be in charge of whole unit, to keep up supplies, to help in laying out the territory, to keep and analyze records.

(2) Assistant foreman to be in charge of actual spraying operations.

(3) Mechanic to be in charge of care and running of the power unit and to mix up solutions while the power sprayer is being used. He would mix solutions, lay out area and cut trails when hand spraying is being done.

(4) Four crew men.

In this plan the crew would use power equipment until they had covered a fairly good size d area, then they would clean up the fringes and outlying sections with hand equipment. Thus they would have to be equipped with eight hand sprayers.

D. General Suggestions

I. Whistle and signaling system

It was found to be very unsatisfactory to signal by vocal means.

It was found to be very unsatisfactory to signal by hand waving.

While the engine, (especially true in the case of the Ross pumper), was in action, the mechanic could not hear the foreman's signals. If a shrill basket-ball whistle were used, a satisfactory signaling system could be worked out.

II. Checking

(a) From experience gained in the small amount of checking for missed Ribes done by the crew this year, I would say that after the crew has been spraying for about a week, it would be valuable for this same crew to spend about one day checking the first work done. In this way, the crew men themselves will get a chance to see just where missed Ribes or missed parts of Ribes are located.

(b) Suggested data to be taken.

(1) Location of undefoliated stem.

(a) High in brush (over 3 feet).

(b) Low in brush (under 3 feet).

(c) In the open.

(d) Under windfalls or logs.

(2) Classification of missed Ribes.

(a) End of stem.

(b) One-half of stem.

(c) Whole branch or stem.

(d) Whole bush.

III. Assistant foremen should be permanent and not appointed each day as done last field season.

E. Tables and Maps

I. Legend for tables

(T). Fuel used in P.M. Pumper was made up $\frac{1}{8}$ pint of oil to 1 gallon of gasoline.

(T). Fuel for R. pumper was made up 1/3 pint of oil to 1 gallon of gasoline.

while the engine, (especially true in the case of the Mora pumper), was in action, the mechanic could not hear the foreman's signals. If a shrill basket-ball whistle were used, a satisfactory signaling system could be worked out.

II. Checking

(a) From experience gained in the small amount of checking for missed Mikes done by the crew this year, I would say that after the crew has been spraying for about a week, it would be valuable for this same crew to spend about one day checking the first work done. In this way, the crew men themselves will get a chance to see just where missed Mikes or missed parts of Mikes are located.

(b) Suggested data to be taken.

(1) Location of undefoliated stem.

(a) High in brush (over 3 feet).

(b) Low in brush (under 3 feet).

(c) In the open.

(d) Under windfalls or logs.

(2) Classification of missed Mikes.

(a) Bud of stem.

(b) One-half of stem.

(c) Whole branch or stem.

(d) Whole bush.

III. Insulants formerly used and materials now in use.

A. Tables and Text

I. Insulant for tables

(1). Fuel used in F.M. Pumper was made up ½ pint of oil to 1 gallon of gasoline.

(2). Fuel for E. Pumper was made up 1/3 pint of oil to 1 gallon of gasoline.

P. M. stands for Pacific Marine.
R. stands for Ross.
All time recorded in terms of man hours.
*Spray used was fresh water.

Table No. 1

Daily Summary with Power Sprayer
Chemical Eradication Plots, Clarkia, Idaho

Date	Type of Pump-er	Total Time of Run		Interruption of Service				Area Worked		(T) Gals. Fuel Used	Working Pressure in Lbs.	*Gallons Spray Used
				Handling Equipment		Other Causes						
		Man Hrs.	Man Mins.	Hrs.	Mins.	Hrs.	Mins.	Block	Acres			
Aug. 15	P.M.	5	48	22	30	1	12	Preliminary		1/2	55	40
16	"	3	30	39	48	1	42	"	"	) 1	70	18
17	"	5	48	39	--	--	--	"	"	)	75	61
18	"	6	24	5	--	--	54	"	"	1/2	75	56
18	R.	3	36	25	--	--	30	"	"	1	175-325	44
19	P.M.	12	12	14	24	13	36	I	2.96	1/2	50-75	77
20	"	4	12	3	18	4	48	I	.54	1/2	50-75	32
20	R.	2	--	4	42	33	--	Trouble-	- - -	- - -	- - -	- - -
22	"	13	48	6	50	12	22	I	3.5	1-1/2	175	105
23	"	16	36	15	24	15	--	II	1.2	1-1/2	175	151
24	"	7	24	4	08	27	52	II	.3	1	175	65
26	P.M.	19	--	11	36	9	30	II	1.5	1/2	75	152
31	"	3	24	2	54	25	30	VII	.62	1/2	75	25
Sept. 2	"	12	40	12	45	6	35	VII	.91	1/2	75	105
3	"	6	45	1	40	31	45	VII	.5	) 1/2	75	38
8	"	6	48	2	02	--	--	VII	.6	)	75	51

P. M. stands for Pacific Marine.
K. stands for Knox.
All time recorded in terms of man hours.
Spray used was fresh water.

Table No. 1

Daily Summary of A Power Survey
Imperial Irrigation Dist., Elvira, Idaho

Date	Type of Farm	Weather Conditions	Interruptions of Delivery				Time Worked		(a) Delay Total	Productive Irrigation Time	"Net" Irrigation Time
			Hrs.	Time	Hrs.	Time	Start	Stop			
Aug. 15	P.M.	S	48	30	1	12	Preliminary		1/2		
16	"	S	48	30	1	48	"	"			
17	"	S	48	30	--	--	"	"			
18	"	S	48	30	--	--	"	"	1/2		
19	"	S	48	30	--	--	"	"			
20	"	S	48	30	--	--	"	"			
21	K.	S	--	48	1	24					
22	"	S	48	30	1	12	5:45	7-1/2			
23	"	S	48	30	1	48	7-1/2				
24	"	S	48	30	--	--					
25	"	S	48	30	--	--					
26	"	S	48	30	--	--					
27	"	S	48	30	--	--					
28	"	S	48	30	--	--					
29	"	S	48	30	--	--					
30	"	S	48	30	--	--					
31	"	S	48	30	--	--					
Sept. 1	"	S	48	30	--	--					
2	"	S	48	30	--	--					
3	"	S	48	30	--	--					
4	"	S	48	30	--	--					
5	"	S	48	30	--	--					
6	"	S	48	30	--	--					

Table No. 2

Condensed Spraying Summary
Chemical Eradication, Clarkia, Idaho

Area worked		Type of Pumper	Working Pressure in lbs.	Gals. of Fuel	Gals. of Chemical	Total Spray Time		Interruptions of service: Handling Equipment		Interruptions of service: Other Causes	
Block	Acres					Hours	Mins.	Hours	Mins.	Hours	Mins.
Preliminary		P.M.	55-75	2	199	24	30	304	18	3	48
"	"	R.	175-225	1	44	3	30	25	--	--	30
I	3.5	P.M.	50-75	1	109	16	24	17	42	18	24
I	3.5	R.	175	1½	105	13	48	6	50	12	22
II	1.5	R.	175	2½	216	24	--	19	32	42	52
II	1.5	P.M.	75	½	152	19	--	11	36	9	30
VII	2.63	P.M.	75	1½	219	29	37	19	21	63	50

Table No. 3

Delivery Tests
Chemical Eradication, Clarkia, Idaho

Type of Pumper	Feet of 1" Hose	Feet of ½" Hose	Feet of 3/8" Hose	Feet of 1/4" Hose	Number of Laterals	Number of Nozzles	Gallons per Minute
P.M.	50	--	--	--	--	--	7-1/4
P.M.	50	--	300	100	4	--	5
P.M.	50	--	300	100	4	4	3-1/4
P.M.	50	--	300	--	4	4	3-1/2
P.M.	50	--	300	100	4	--	6-1/2
P.M.	50	--	200	--	4	--	(?)
P.M.	50	--	50	50	1	1	1/3
P.M.	50	--	50	50	1	--	2/3
P.M.	50	--	100	--	1	1	1-1/3
P.M.	50	--	100	--	1	--	3
P.M.	50	--	--	100	2	--	3
P.M.	50	--	--	100	2	2	1-1/4
P.M.	50	--	100	--	2	--	6
P.M.	50	--	100	--	2	2	1-1/3
P.M.	50	--	100	100	4	4	3-1/4
P.M.	50	--	100	100	4	--	6-1/4
P.M.	100	--	--	--	--	--	7-1/4
P.M.	--	100	--	--	--	--	5
P.M.	--	50	--	--	--	--	5-3/4
P.M.	--	100	300	100	4	4	1-3/4

No pressure recorded in the above tests.

Table No. 1

Chemical Analysis Summary
Chemical Production, Plants, Table

Area Served	Type of Trans.	Running Time - Hrs.	Date. Total Trans.	Date. of Pass.	Total Service Time - Total	Interruptions of service: Handling Equipment	Interruptions of service: Other Causes
Trolley Interurb.	F.M.	45-75	3	189	24	2¼	1½
"	"	1.75-2	1	44	3	1½	—
I	I.1	2.M.	3	132	14	2¼	1½
I	I.3	2.	1	106	12	1	½
II	I.3	1.	2	218	24	—	½
II	I.3	I.3.	1	142	12		
VII	I.5	I.M.	1	218	22	1½	1

Table No. 2

Delivery Tabs
Chemical Production, Plants, Table

Type of Item	Feet of 1" Item	Feet of 2" Item	Feet of 3/4" Item	Feet of 1/4" Item	Number of Tabulations	Number of Pass. per Machine	Gallons per Month
2.M.	90	—	—	—	—	—	1-1/4
2.M.	85	—	350	10	4	—	1
2.M.	80	—	320	—	4	4	1-1/2
2.M.	90	—	370	—	4	4	1-1/2
2.M.	80	—	310	100	4	—	1-1/4
2.M.	80	—	320	—	4	—	(1)
2.M.	80	—	60	50	1	1	1-1/4
2.M.	80	—	80	30	1	—	1-1/4
2.M.	50	—	200	—	1	—	1-1/4
2.M.	90	—	350	—	1	—	1
2.M.	90	—	—	200	4	—	1
2.M.	80	—	—	—	5	3	1-1/4
2.M.	80	—	100	—	4	—	
2.M.	90	—	400	—	4	4	1-1/2
2.M.	80	—	300	100	4	4	1-1/2
2.M.	85	—	170	100	4	—	1-1/4
2.M.	100	—	—	—	—	—	1-1/4
2.M.	—	70	—	—	—	—	1
2.M.	—	80	80	—	—	—	1-3/4
2.M.	—	100	300	—	4	4	1-3/4

No pressure recorded in the above tests.

Table No. 3 (cont'd)

Delivery Tests

Chemical Eradication, Clarkia, Idaho

Type of Pumper	Pressure in pounds	Feet of 1" hose	Feet of 1/2" hose	Feet of 3/8" hose	Feet of 1/4" hose	Number of laterals	Number of Nozzles	Gallons per Minute
F.M.	--	--	100	300	100	4	--	4
"	--	--	100	300	--	4	--	4-3/4
"	75	--	100	300	--	4	4	1-1/2
"	75	--	100	100	--	2	2	3/4
"	--	--	100	100	--	2	--	4-1/4
"	75	--	100	200	--	2	2	3/4
"	--	--	100	200	--	2	--	5
"	75	--	100	100	--	1	1	1/2
"	60	--	100	100	--	1	--	2-1/4
"	75	--	100	50	--	1	1	1/4
"	60	--	100	50	--	1	--	3
"	70	--	100	300	--	3	3	1-1/10
"	45	--	100	300	--	3	--	4-1/5
"	75	--	100	250	--	3	3	1
"	50	--	100	250	--	3	--	4
"	75	--	100	100	100	2	2	9/10
"	60	--	100	100	100	2	--	2-1/3
"	75	--	100	50	50	1	1	1/2
"	70	--	100	50	50	1	--	1-1/3
"	75	--	100	200	100	2	2	3/10
"	60	--	100	200	100	2	--	2-1/5
"	70	--	100	100	50	1	1	1/2
"	70	--	100	100	50	1	--	1-1/4
"	75	--	100	100	100	1	1	1/5
"	75	--	100	100	100	1	--	9/10
"	75	--	100	50	100	1	1	1/4
"	75	--	100	50	100	1	--	1
"	80	--	100	--	100	1	1	1/4
"	75	--	100	--	100	1	--	1-1/10
"	75	--	100	--	100	2	2	1/2
"	60	--	100	--	100	2	--	2
"	75	--	100	--	50	1	1	1/4
"	75	--	100	--	50	1	--	1-1/3
R.	--	50	--	--	--	--	--	14
"	--	--	50	--	--	--	--	11
"	--	--	100	--	--	--	--	8
"	--	50	--	--	--	--	--	12-1/3
"	175	50	--	300	100	4	4	1-9/10
"	150	50	--	300	100	4	3	1-1/2
"	150	50	--	300	100	4	2	1-1/15
"	150	50	--	300	100	4	1	5/10

Table No. 3 (cont'd)

Delivery Tests
Chemical Proportioning Pipeline, Pipeline 11

Type of Water	Pressure in Pounds	Feet of 1" Hose	Feet of ¾" Hose	Feet of 5/8" Spray	Feet of 1/4" Hose	Number of Lateral s	Number of Nozzles	Gal lons per
Fr.	---	---	100	300	100	4	---	
"	---	---	100	300	---	4	---	
"	75	---	100	300	---	4	4	
"	75	---	100	300	---	2	2	
"	---	---	100	300	---	4	---	
"	75	---	100	300	---	2	2	
"	---	---	100	300	---	2	---	
"	75	---	100	300	---	1	1	
"	80	---	100	300	---	1	---	
"	75	---	100	300	80	1	1	
"	80	---	100	300	80	1	---	
"	75	---	100	300	---	2	2	
"	80	---	100	300	---	2	---	
"	75	---	100	300	---	1	1	
"	80	---	100	300	---	1	---	
"	75	---	100	300	100	2	2	
"	80	---	100	300	100	2	---	
"	75	---	100	300	80	1	1	
"	80	---	100	300	80	1	---	
"	75	---	100	300	100	2	2	
"	80	---	100	300	100	2	---	
"	75	---	100	300	80	1	1	
"	80	---	100	300	80	1	---	
"	75	---	100	300	100	1	1	
"	80	---	100	300	100	1

Table No. 4

Analysis of Power Spraying
Chemical Eradication, Clarkia, Idaho

Acres Worked		Gallons of Spray Used	Type of Spray Used	Man Spraying Time		Man Time Handling Equipment		Total Time	
Block	Acres			Hours	Minutes	Hours	Minutes	Hours	Minutes
I	3.5	98	Hand	47	42	--	--	47	42
I	3.5	109	P.M.	16	24	14	12	30	36
I	3.5	105	R.	12	02	13	54	25	56
II	1.5	224	Hand	66	36	--	--	66	36
II	1.5	152	P.M.	19	--	11	36	30	36
II	1.5	216	R.	23	44	19	32	43	16

(a) Notes on the foregoing summary. The year before both these blocks were sprayed by hand sprayer. Figures for hand spraying were taken from 1926 notes.

On Block I. The Pacific Marine pumper was used before the Ross pumper.

On Block II. The Ross pumper was used first. By manipulation of the hose lines, one set-up used with the Ross pumper was eliminated when the Pacific Marine pumper was used. When the Pacific Marine pumper was used, the brush was very wet, thus saving much spray.

(b) Conclusions drawn from table.

(1). It is difficult to tell which of the power sprayers was the more economical, due to the fact that on both blocks less time and spray solution were consumed by the last sprayer used.

(2). This would indicate, as would be expected, that the second time through, the travel is easier and less spray is wasted.

(3). Power spraying for these areas was profitable.

(a) Because though slightly more spray was used on Block I, the time saved would more than make up for the extra spray used.

(b) Because on Block II, time and spray both were saved by power spraying. The maximum time for power spraying was slightly over 2/3 that required for hand spraying.

(c) The cost of running pumper is very small.

Table No. 1

Analysis of Long Spraying
Chemical Treatment, Glenola, Idaho

Acre Period		Machine	Type of Spray	Mean Spraying Time		Mean Time Reading Hand Vest		Total Time	
Block	Spray	Used	Used	Hours	Minutes	Hours	Minutes	Hours	Minutes
I	1.6	96	Hand	47	40	---	---	47	40
I	2.5	109	I.E.	16	24	14	14	30	38
I	3.6	136	E.	17	02	12	84	29	26
II	1.6	144	Hand	66	24	---	---	66	24
II	1.6	182	I.E.	19	---	11	84	30	84
II	1.6	174	E.	24	44	18	72	42	16

(a) Notes on the foregoing summary. The year before both these blocks were sprayed by hand sprayer. Figures for hand spraying were taken from 1928 notes.

On Block I. The Pacific Marine pumper was used before the Moss pumper.

On Block II. The Moss pumper was used first. By manipulation of the hose lines, one set-up used with the Moss pumper was eliminated when the Pacific Marine pumper was used. When the Pacific Marine pumper was used, the brush was very wet, thus saving much spray.

(b) Conclusions drawn from table.

(1). It is difficult to tell which of the power sprayers was the more economical, due to the fact that on both blocks less time and spray solution were consumed by the last sprayer used.

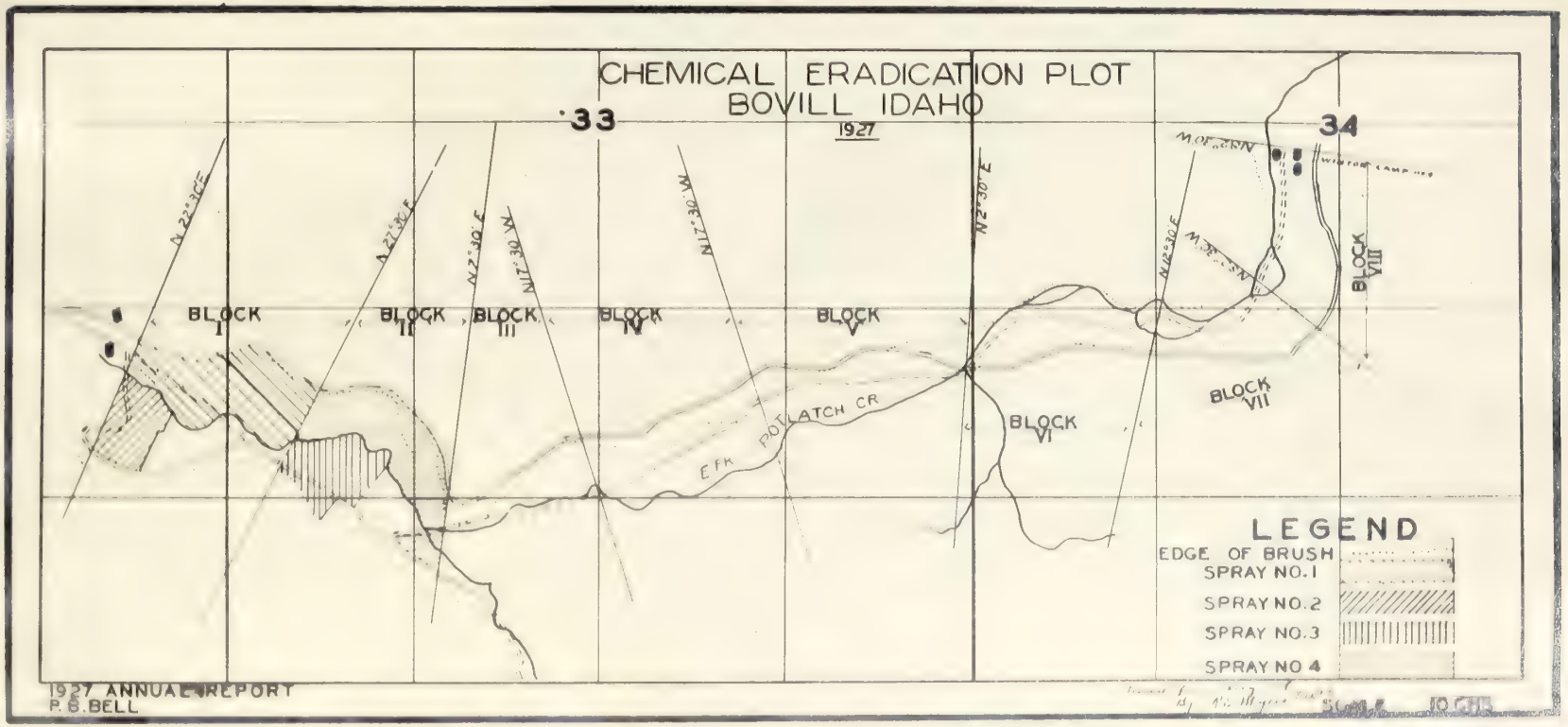
(2). This would indicate, as would be expected, that the second time through, the travel is easier and less spray is wasted.

(3). Power spraying for these areas was profitable.

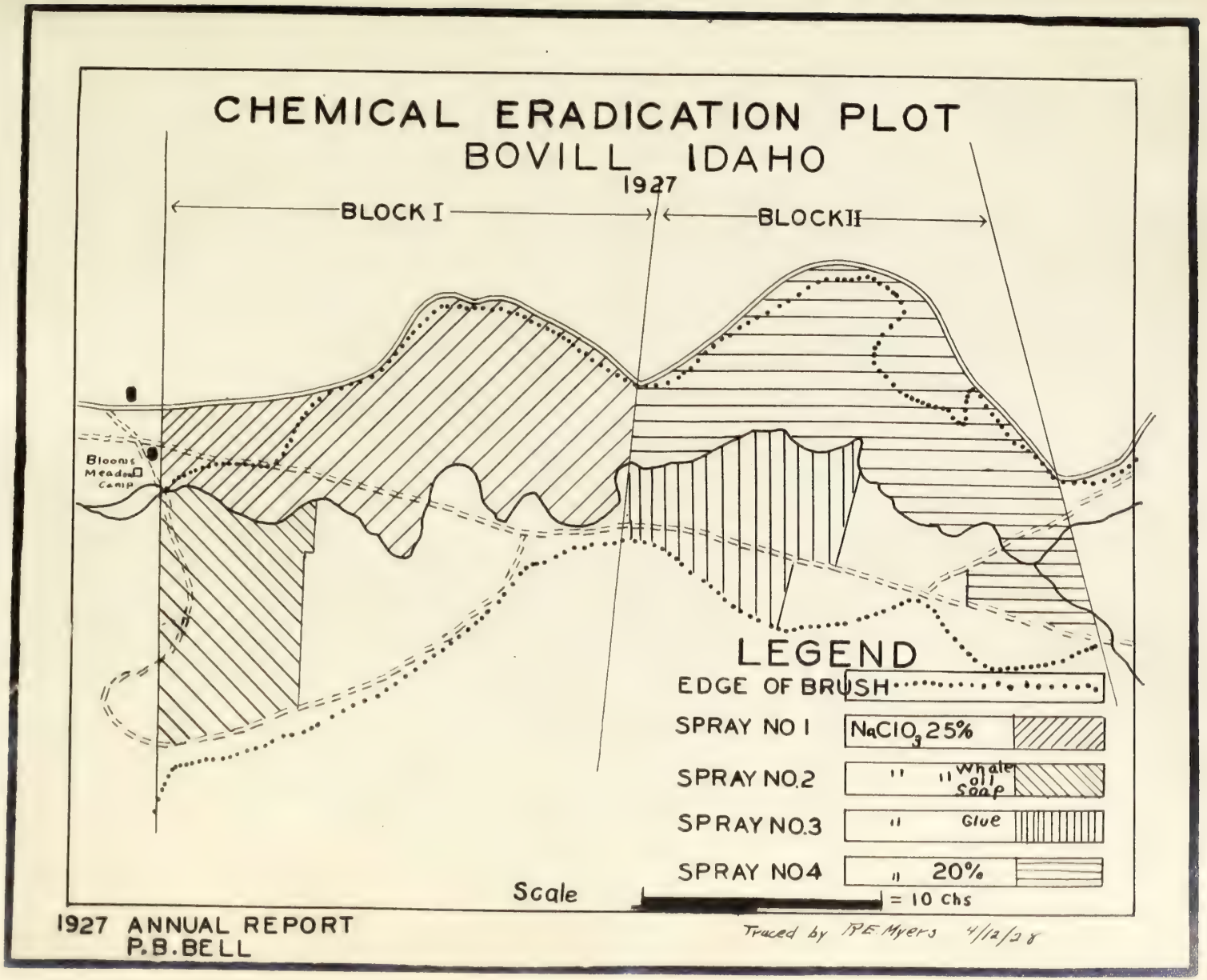
(a) Because though slightly more spray was used on Block I, the time saved would more than make up for the extra spray used.

(b) Because on Block II, time and spray both were saved by power sprays. The maximum time for power spraying was slightly over 1/3 that required for hand spraying.

(c) The cost of running pumper is very small.



1927 ANNUAL REPORT
P. S. BELL


CHEMICAL ERADICATION PLOT
BOVILL IDAHO
1927
BLOCK I
BLOCK II
Blooms Meadow Camp
LEGEND
EDGE OF BRUSH
SPRAY NO 1
NaClO3 25%
SPRAY NO.2
" " Whale oil Soap
SPRAY NO.3
" Glue
SPRAY NO4
" 20%
Scale
= 10 chs
1927 ANNUAL REPORT
P.B. BELL
Traced by P.E. Myers 4/12/28

WF-BRC-#35

General Description of Experimental Study Area

Name of Area RIBES ECOLOGY Twp. Range

Location by

W. A. Rockie
Assistant Pathologist

Timber Composition (Species by %)

I. Definition of the Experiment

Age Class The objective of this project is to learn more about why, how, when and where Ribes do and do not grow.

Eradication Type

II. Methods of Study

Soil Conditions:

1) Do It was found necessary to develop individual methods of work for each one of the several experiments in progress.

c. Loss underground

All data taken under the several studies were recorded on the following forms, BRC-WF #35 and #36:

2) Mineral Soil (depth, texture, moisture, etc.)

Ground Cover:

1) Shrubs

% Ground Covered

2) Herbs and Grasses

% Ground Covered

Ribes abundance by species:

Class of Burn (A - B - C)

Type of Burn (Crown, Brush, Ground, etc.)

Remarks

Inspected by Date

[illegible]

by

W. A. Dockis
Associate Physiologist

I. Definition of the Experiment

The objective of this project is to learn more about why, when and where fishes do and do not drink.

II. Methods of Study

It was found necessary to develop individual methods of work for each one of the several experiments in progress.

All data taken under the several studies were recorded on the following forms, BBC-WA #36 and #36;

WF-BRC-#35

RIBES ECOLOGY

General Description of Experimental Study Area

Name of Area_____ Sec._____ Twp._____ Range_____

Location_____

_____

Timber Composition (Species by %)_____

_____

Age Class_____ Exposure_____ % Slope_____

Eradication Type_____

Soil Conditions:

1) Down stuff - % Ground covered by (a. Raised logs_____
(b. Logs on ground_____
(c. Logs underground_____

2) Duff (depth, texture, moisture, etc.)_____

_____

3) Mineral Soil (depth, texture, moisture, etc.)_____

_____

Ground Cover:

1) Shrubs_____

_____ % Ground Covered___

2) Herbs and Grasses_____

_____ % Ground Covered____

Ribes (abundance by species)_____

Class of Burn (A - B - C)_____

Type of Burn (Crown, Brush, Ground, etc.)_____

Remarks_____

_____

_____

Recorders_____ Date_____

FIELD NOTES

General Description of Experimental Study Area

Name of Area _____ Typ. _____ Date _____

Location _____

_____

_____

Timber Composition (Species by %) _____

_____

_____

Age Class _____ Moisture _____ Slope _____

Predisposition Type _____

_____

Soil Conditions:

1) Down stuff - % Ground covered by (a. Rotted Logs _____

_____ (b. Logs on Ground _____

_____ (c. Logs Underground _____

2) Duff (depth, texture, moisture, etc.) _____

_____

_____

3) Mineral Soil (depth, texture, moisture, etc.) _____

_____

_____

Ground Cover:

1) Shrubs _____

_____ % Ground Covered _____

2) Herbs and Grasses _____

_____ % Ground Covered _____

Kinds (abundance by species) _____

_____

Class of Burn (1 - 2 - 3) _____

_____

Type of Burn (Crown, Brush, Ground, etc.) _____

_____

Remarks _____

_____

_____

_____

_____

Recorded _____ Date _____

_____

RIBES ECOLOGY

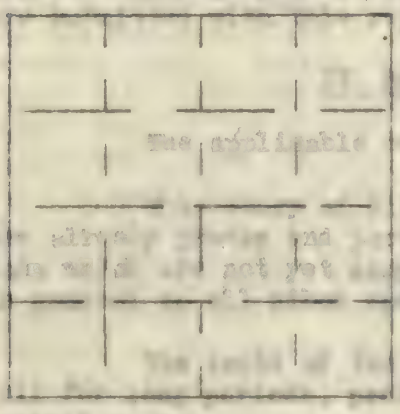
Name and Date of Burn or Area _____ Sec. _____ Twp. _____ Range _____

Location _____

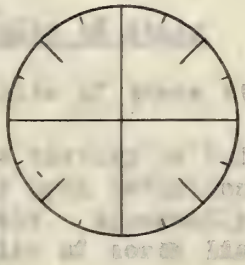
No. of Chain and Milacre _____ Age-class _____ Exposure _____

Mapped by _____ Date _____

Milacre Map



Compass Reading



Map Legend

_____

_____

_____

*Intensities of Burn
1. Unburned.
2. Scorched.
3. Duff partly burned
4. Total duff burn.
5. Hot burn.

Scale 1 inch = 3.3 feet.

Ribes Data

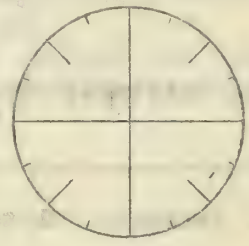
Serial No. of Ribes	Species of Ribes	Year of Germination	Ht. of Bush Feet	Live Stem of Bush Feet	Dead Stem of Bush Feet	New Growth Feet	No. of Fruits	Intensity of Burn*	% and Kind of Shade	Ground Cover Plants: Herbs or Shrubs	Ground Covered	Special

Time Burn
and of or
Date Area C. Typ.

Location

No. of Chain and Village Age-class Exposure

Mapped by Date



*Intensities
of
Burn

1. Unburned.
2. Scorched.
3. Duff partly burned.
4. Total duff burn.
5. Not burn.



Scale 1 inch = 3.3 feet.

Trees Data

No.	Diam.	Ht. of Bark	Live Trees of Bark	Dead Trees of Bark	Dec-ay	No. of	Im-ter-sity of Burn*	Kind of Shad-	Ground Cover Plants and Kind of	Herbs or	Type-

III. Plot Index

The individual studies have been grouped into seven major divisions under the following headings:

A. Controlled Plot Study of Ribes
B. Results of Duff Disturbance
C. Restocking of Ribes after Eradication
D. Root Competition Study
E. Life Habits of Ribes
F. Ribes Seed Germination Tests
G. Leaf-area Live-stem Studies

Each of these major divisions is the subject of a separate report, dealing specificially with that experiment. These separates are submitted with this report.

IV. Results of Study

The applicable results of these studies are briefly as follows:

This story of Ribes history is built partly upon facts which are already proven and partly upon deductions to be substantiated by data which are not yet complete. Apparently, the story as given applies in general to all Ribes species of north Idaho.

The seeds of the native Ribes apparently lie dormant in the soil for long periods, probably remaining viable for as much as several hundred years.

Disturbance of the duff, either a partial destruction by fire or a mechanical disturbance, or any similar upsetting of natural conditions, is usually sufficient to bring new germination. Without the duff disturbance, however, germination of new seedlings is practically lacking.

The most frequent conditions under which these seedlings occur abundantly are following light ground fires, along new roads, trails and railroads, on the disturbed parts of logged areas, the site of burned brush piles, on camp-sites and on upturns.

Apparently the cause of no germination previously is the insulating temperature effect of the duff mantle. A definite, though as yet unknown, soil temperature and soil moisture condition is undoubtedly necessary for the seed germination. It is proven that the surface soil beneath the duff mantle is almost as cold at any time as the

III. Plot Layer

The individual studies have been grouped into seven major divisions under the following headings:

A. Controlled Plot Study of Ribes
B. Results of Duff Disturbance
C. Restocking of Ribes after Eradication
D. Root Competition Study
E. Life Habits of Ribes
F. Ribes Seed Germination Tests
G. Leaf-area Live-stem Studies

Each of these major divisions is the subject of a separate report, dealing specifically with that experiment. These separates are submitted with this report.

IV. Results of Study

The applicable results of these studies are briefly as follows:

This story of Ribes history is built partly upon facts which are already proven and partly upon deductions to be substantiated by data which are not yet complete. Apparently, the story as given applies in general to all Ribes species of north Idaho.

The seeds of the native Ribes apparently lie dormant in the soil for long periods, probably remaining viable for as much as several hundred years.

Disturbance of the duff, either a partial destruction by fire or a mechanical disturbance, or any similar upsetting of natural conditions, is usually sufficient to bring new germination. Without the duff disturbance, however, germination of new seedlings is practically inviting.

The most frequent conditions under which these seedlings occur abundantly are following light ground fires, along new roads, trails and railroads, on the disturbed parts of logged areas, the site of burned brush piles, on rock-slide and on upturns.

Apparently the cause of no germination previously is the insulating temperature effect of the duff mantle. A definite, though as yet unknown, soil temperature and soil moisture condition is undoubtedly necessary for the seed germination. It is proven that the surface soil beneath the duff mantle is almost as cold at any time as the

ground water of the immediate vicinity, even when shielded from direct sunlight by only one inch of duff. It is probable that the soil temperature does not get sufficiently high for germination until the soil moisture content has gotten too low for germination. Insufficient actual data are available to prove this belief, but the meager data available indicate this to be the case.

It now appears quite conclusively that immediately after the duff disturbance, germination of a large amount of stored seeds occurs.

The mortality of these new plants is very high in the first year. As many as 212 seedling Ribes have been found growing on a single square inch of soil. Beginning in the third year, these Ribes start fruiting, reaching their maximum fruit production when they are from 5 to 10 years of age. During the first 5 years following the inception of the new generation of Ribes, they generally are the most abundant shrubby plant. During these years, the accumulation of duff is practically nil. During the succeeding 10 years, these Ribes produce and drop their seed to the ground, where most of them are believed to lie undisturbed. From the fact that these seeds seldom germinate on this soil in the early years of the plant, it appears possible that a long resting period is normal for the seeds of this group of plants. It may be, however, that the fact that germination of these new seeds is unusual, is due to the excessive droughtiness of this exposed mineral soil. The soil moisture under these conditions gets too low for germination much earlier in the season than does the normal forest soil, so the temperature-mositure relation previously mentioned may still be the cause.

From 10 to 20 years following the newly incepted Ribes generation, the other shrubs and the young conifers grow much more rapidly than do the Ribes, and many of the latter die. A much heavier autumnal mantle of foliage is deposited on the soil with each succeeding year, and the seeds which have been dropped for several years past and which the growing Ribes bushes are still dropping, are covered with the beginning of a new duff mantle.

By the time 30 years have passed most of the Ribes have ceased to live, except along drainage channels, and a fairly heavy mantle of duff now covers the ground. Constantly increasing shade brings a constantly decreasing number of Ribes, so that in dense timber stands of 30 years and older, practically no Ribes remain. In stands of all ages the old Ribes bushes may still persist in the openings and along drainageways. The oldest native Ribes bush that has yet been recorded in the West was about 42 years of age. This was reported from the eradication camps. The oldest bush encountered on the ecology studies was 40 years old. The new timber stand continues toward maturity with practically no Ribes present until fire, logging or some similar disturbance occurs to suffi-

ground water of the immediate vicinity, even when shielded from direct sunlight by only one inch of duff. It is probable that the soil temperature does not get sufficiently high for germination until the soil moisture content has gotten too low for germination. Insufficient actual data are available to prove this belief, but the meager data available indicate this to be the case.

It now appears quite conclusively that immediately after the duff disturbance, germination of a large amount of stored seeds occurs.

The mortality of these new plants is very high in the first year. As many as 112 seedling Ribes have been found growing on a single square inch of soil. Beginning in the third year, these Ribes start fruiting, reaching their maximum fruit production when they are from 5 to 10 years of age. During the first 5 years following the inception of the new generation of Ribes, they generally are the most abundant shrubby plant. During these years, the accumulation of duff is practically nil. During the succeeding 10 years, these Ribes produce and drop their seed to the ground, where most of them are believed to lie undisturbed. From the fact that these seeds seldom germinate on this soil in the early years of the plant, it appears possible that a long resting period is normal for the seeds of this group of plants. It may be, however, that the fact that germination of these new seeds is unusual, is due to the excessive dryness of this exposed mineral soil. The soil moisture under these conditions gets too low for germination much earlier in the season than does the normal forest soil, so the temperature-moisture relation previously mentioned may still be the cause.

From 10 to 80 years following the newly accepted Ribes generation, the other shrubs and the young conifers grow much more rapidly than do the Ribes, and many of the latter die. A much heavier autumnal mantle of foliage is deposited on the soil with each succeeding year, and the seeds which have been dropped for several years past and which the growing Ribes bushes are still dropping, are covered with the beginning of a new duff mantle.

By the time 80 years have passed most of the Ribes have ceased to live, except along drainage channels, and a fairly heavy mantle of duff now covers the ground. Consequently increasing shade brings a constantly decreasing number of Ribes, so that in dense timber stands of 80 years and older, practically no Ribes remain. In stands of all ages the old Ribes bushes may still persist in the opening and along drainageways. The oldest native Ribes bush that has yet been recorded in the West was about 80 years of age. This was reported from the eradication camps. The oldest bush encountered on the ecology studies was 60 years old. Two new timber stand conditions toward maturity with practically no Ribes present until fire, logging or some similar disturbance occurs to scarify

ciently arouse and warm the stored Ribes seeds. The seeds of any surviving Ribes bushes which still persist in this stand, drop onto the heavy duff mantle. The upper part of this duff is so loose that it gets too dry long before the surface duff gets sufficiently warm to germinate Ribes seeds.

With a new disturbance such as fire or logging, whether it occurs 25 years or 200 years later, this story is re-enacted. Apparently the succeeding Ribes stand is assured of successful perpetuation unless the stored seeds are all destroyed by a severe ground fire or by repeated fire on a given area. The absence of Ribes from any given area may be due to the fact that Ribes have never grown there, or that the seeds have been destroyed by fire.

V. Summary

1. Definition of the Experiment

Laboratory germination tests required a minimum of 5 months of dormancy before showing any germination.

Stored Ribes seeds which are in the basal portion of the duff in Ribes free timber stands may germinate after any disturbance of the duff.

This disturbance may be light or moderately severe ground fire, log-skidding, road-building, trail-building, upturns or any like disturbance.

Although the germination of stored seed usually occurs the first growing season after the duff disturbance, no iron-clad rule can yet be stated. If the disturbance occurs during early spring, germination may (1) follow almost immediately (2) it may hold over until the fall germinating season or (3) it may not occur until the following spring. On disturbances occurring during the summer, germination has occurred occasionally in September immediately thereafter, but usually not until the following spring. Fall and winter disturbances are generally followed by spring germination.

Studies to date show that more than 50% of Ribes seedlings which follow any disturbance come from seed located in the bottom 1/10 inch of the decayed duff.

Hand-pulling eradication of stream type results in a large number of new seedling Ribes on those areas of the duff mantle which were disturbed. This holds for both G. <u>inerme</u> and R. <u>lacustre</u> sites.

Bottomlands which were chemically sprayed show many new R. <u>petiolare</u> seedlings on the eradicated area.

The removal of the shade factor, without disturbing the duff, does not result in germination of Ribes.

Beneath a complete shade canopy, the disturbance of the duff does result in germination. Survival of seedlings under heavy shade is relatively low. Survival of seedlings in an open situation is (1) very high if on a moist site and (2) very low if on a dry site.

The maximum number of Ribes per acre in the life of the plant is the first year following duff disturbance for R. viscosissimum, and either the first or second year for R. lacustre.

Ribes of north Idaho begin fruiting in their third summer. General fruiting begins in their fourth or fifth summer.

CONTROLLED PLOT STUDY OF RIBES

I. Definition of the Experiment

A study of controlled field conditions designed to show whether or not viable seeds of R. viscosissimum are present in forest duff of different ages, or if the viable seeds of R. viscosissimum from which plants of this species normally develop on forest areas are recently deposited through some disseminating agency, such as wind, water, birds, and rodents. And by studying such plants as they appear and grow under the controlled conditions, to determine under which conditions the seeds germinate, and to what extent such plants survive to maturity. Also to determine the same facts regarding any other species of Ribes which may appear in the experimental plots thus established.

II. Types of Areas Selected

Potential R. viscosissimum sites were selected, taking care, in most instances, to select areas which were definitely free of Ribes plants, and had been free for at least several years. The basis used was as follows:

If R. viscosissimum was present in newly-disturbed adjacent areas, it was assumed that the adjacent forested areas not having these plants represented potential sites.

Within these limitations most of the experimental plots were placed as far as practicable from fruiting plants of R. viscosissimum. In most cases, the plots were placed in the center of an acre which careful search showed to contain no bushes capable of producing fruits, previous to the year when the experiment was established. Therefore,

The removal of the shade factor, without disturbing the duff, does not result in germination of Ribes.

Beneath a complete shade canopy, the disturbance of the duff does result in germination. Survival of seedlings under heavy shade is relatively low. Survival of seedlings in an open situation is (1) very high if on a moist site and (2) very low if on a dry site.

The maximum number of Ribes per acre in the life of the plant is the first year following duff disturbance for R. _vicosissimum_, and either the first or second year for R. _lacustre_.

Ribes of north Idaho begin fruiting in their third summer. General fruiting begins in their fourth or fifth summer.

I. Initiation of the Experiment

A study of controlled field conditions designed to show whether or not viable seeds of R. _vicosissimum_ are present in fruit of different ages, or if the viable seed of R. _vicosissimum_ from which plants of this species normally develop on forest areas recently deposited through some disseminating agency, such as wind, water, birds, and rodents. And by studying such plants as they grow and grow under the controlled conditions, to determine under which conditions the seeds germinate, and to what extent such plants survive to maturity. Also to determine the same facts regarding any other species of Ribes which may appear in the experimental plots thus established.

II. Area of Study Selected

Potential R. _vicosissimum_ sites were selected, taking care, in most instances, to select areas which were definitely free of Ribes plants, and had been free for at least several years. The basis used was as follows:

If R. _vicosissimum_ was present in nearly adjacent areas, it was assumed that the soil would contain seed of this plant representing potential plots.

While these limitations meet of the experimental plots were located as far as practicable from fruiting plants of R. _vicosissimum_. In most cases, the plots were placed in the center of an acre which previous to the year when the experiment was established. Therefore,

the Ribes free area about the experimental plots usually ranged from one to several hundred acres.

The experimental plots were selected in several widely separated portions of the Idaho white pine region to make the study as wide in scope as practicable.

Insect killed and fungus killed areas of mature timber were desired for this study, but no satisfactory locations were found.

III. Methods of Study

A. Subdivisions of Experimental Unit.

An individual complete set of experimental plots consisted of 36 milacre units laid out as follows:

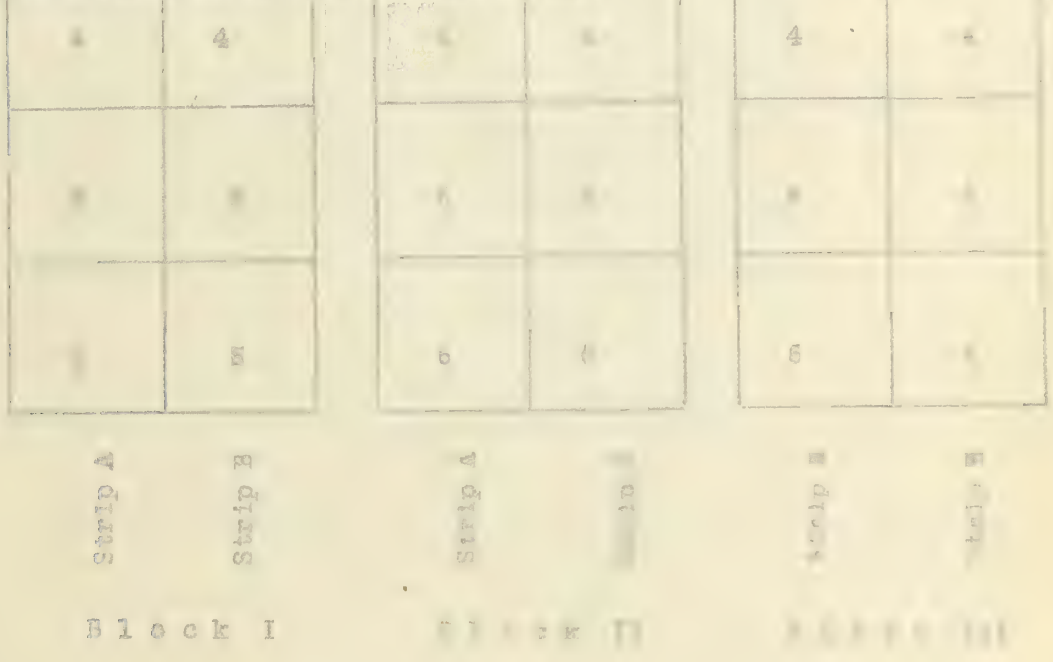
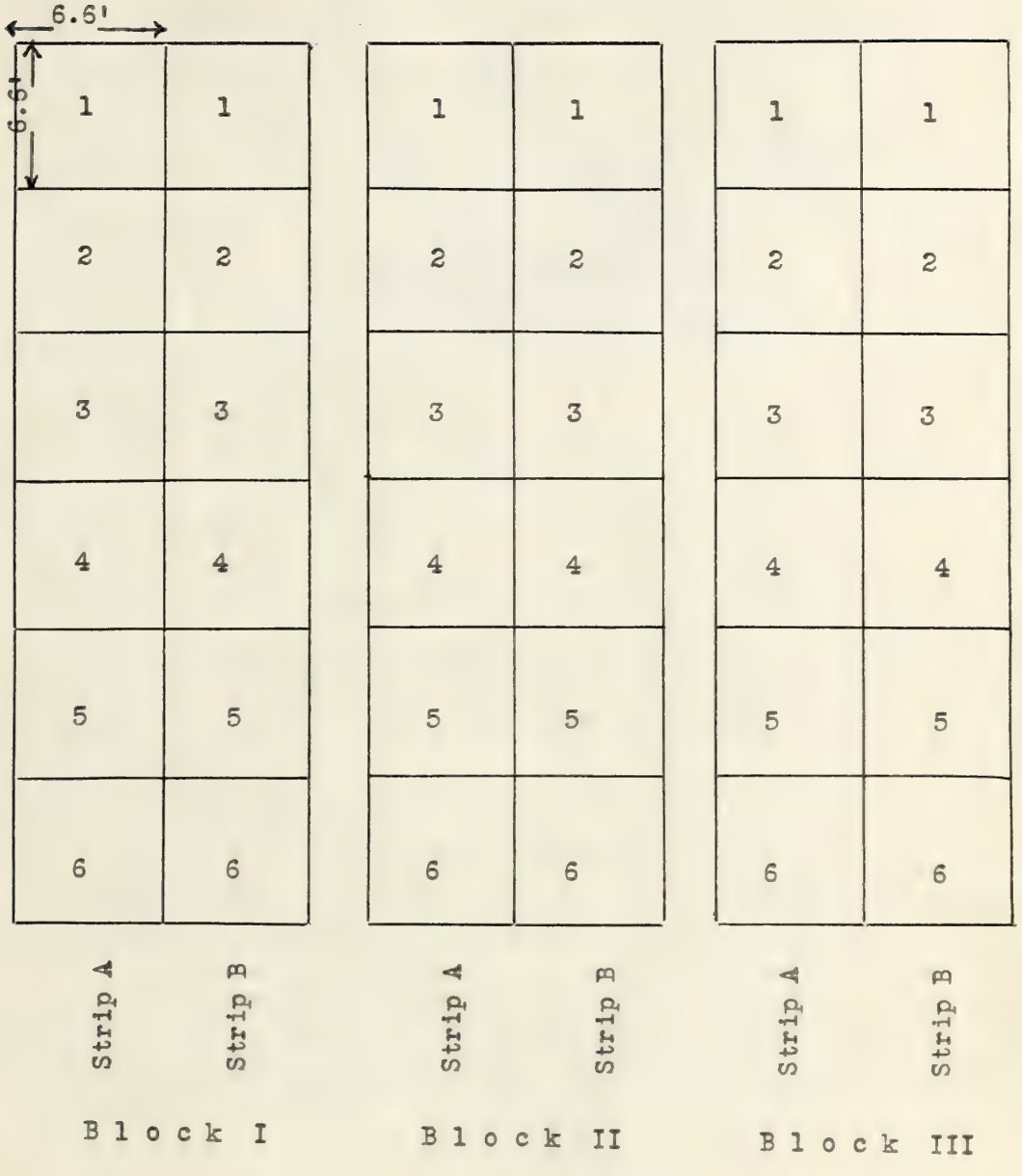


TABLE NO. 1



The entire area is enclosed within a 4-wire barbed fence.

Block I is not otherwise protected.

Block II is also protected by a fence of window screen, which is intrenched below ground and stands 3 feet above ground.

Block III is fenced identically with Block II. Also covered by muslin roof which is supported by chicken wire.

Strip A of each block has R. viscosissimum fruits planted and staked at specified intervals.

Strip B was left unplanted.

Plots #1 are check plots, and were not disturbed.

Plots #2 have the undecayed upper duff removed.

Plots #3 have artifically made skid-trails.

Plots #4 have all duff removed to mineral soil.

Plots #5 have the surface duff lightly burned.

Plots #6 have the duff mantle entirely burned.

IV. Plan for Recording Data

Definite forms, WF-BRC #35 and #36, were made for systematically recording results as they developed on the plots.

During the first season, inspections were made at one month intervals. During following years, the first seasonal inspection will be made in the spring before new growth starts, and as often thereafter as is necessary to keep a complete record of any changes taking place in the plots.

The entire area is enclosed within a 4-wire barbed fence.

Block I is not otherwise protected.

Block II is also protected by a fence of window screen, which is interwoven below ground and stands 3 feet above ground.

Block III is fenced identically with Block II. Also covered by muslin roof which is supported by chicken wire.

Strip A of each block has *K. viscosissimum* fruits planted and staked at specified intervals.

Strip B was left unplanted.

Plots #1 are check plots, and were not disturbed.

Plots #2 have the undecayed upper duff removed.

Plots #3 have artificially made skid-trails.

Plots #4 have all duff removed to mineral soil.

Plots #5 have the surface duff lightly burned.

Plots #6 have the duff mantle entirely burned.

IV. Plan for Recording Data

Definite forms, WP-RMC #36 and #36, were made for systematically recording results as they developed on the plots.

During the first season, inspections were made at one month intervals. During following years, the first seasonal inspection will be made in the spring before new growth starts, and as often thereafter as is necessary to keep a complete record of any changes taking place in the plots.

TABLE NO. 2

Plot Index

Name of Plot	Location of Plot			Slope		Timber Age-Class	Complete or Partial set	Date Established
	S	T	R	Direction	%			
Meadow Creek Germination Study #1	14	42N	3W	E	35%	100-160 D.M.	16 Milacres	June 25-July 5
Cedar Creek " " #1	14	43N	3W	E-SE	25%	20-40 O.R.	4 Milacres	July 5 - July 15
Gold Hill " " #1	20	42N	3W	E-SE	50%	30-40 D.R.	Complete	July 11-July 20
" " " " #2	20	42N	3W	SE	7%	140 + 60	5 Milacres	July 25-July 28
" " " " #3	20	42N	3W	NE	50%	150 + O.M.	5 Milacres	July 27-Aug. 10
Camp D " " #1	15	41N	2E	E	5%	100-200 D.M.	Complete	Aug. 17-Aug. 26
Pierce " " #1	2	36N	5E	N	30%	50 D.P.	Complete	July 17-Aug. 5
Lakeview " " #1	9	53N	1W	NE	5%	40 D.P.	Complete	July 6 - July 15
" " " #2	"	"	"	"	"	D.P.	Complete	July 15-July 23
" " " #3	"	"	"	"	"	D.P.	Complete	July 30-Aug. 15
" " " #4	"	"	"	"	"	D.P.	Complete	Sept. 1-Sept.15

Plot Index

Name of plot	Location on plot				Crops planted	Number of plants	Crops harvested	Number of plants	Date



Meadow Creek Dam #1



W175. Meadow Creek Burn #1. Vegetation of original forest floor above; vegetation of burned forest floor below. Plots were established on area of which the upper part of the picture is a portion.



W56?. Meadow Creek Germination Study #1 in partially completed condition. Burning in progress. This study covers almost the entire area of an unburned island.



Gold Hill Germination Study #1

Idaho. Road building in a 40-yr. Ribes-free stand of timber disturbed the duff. These R. viscosissimum are the result. W391

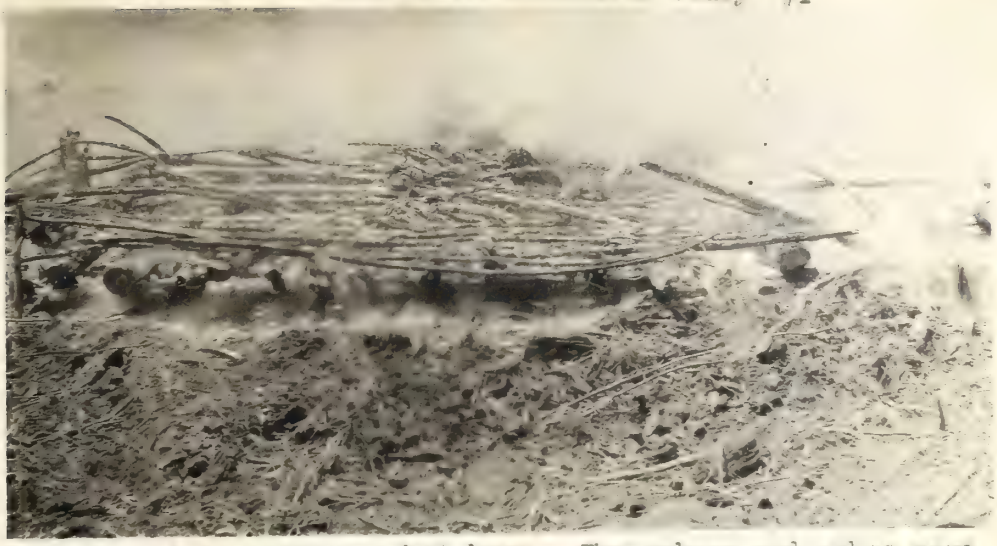


Ribes-free 40-yr. old stand where plots were established. Bank in foreground is the cut at upper edge of road. Opening thru timber marks road on other side. W392



W390

Making preparations for a hot burn. Burning of these plots was an important part of the experiment.



Method used in getting a hot burn. The embers and ashes were later raked and moved repeatedly to insure a burn to mineral soil. Unburned pockets of duff were found even after these precautions.



Showing methods of fencing and preparing plots. Rigid fences and supports for both fences and roofs were erected.



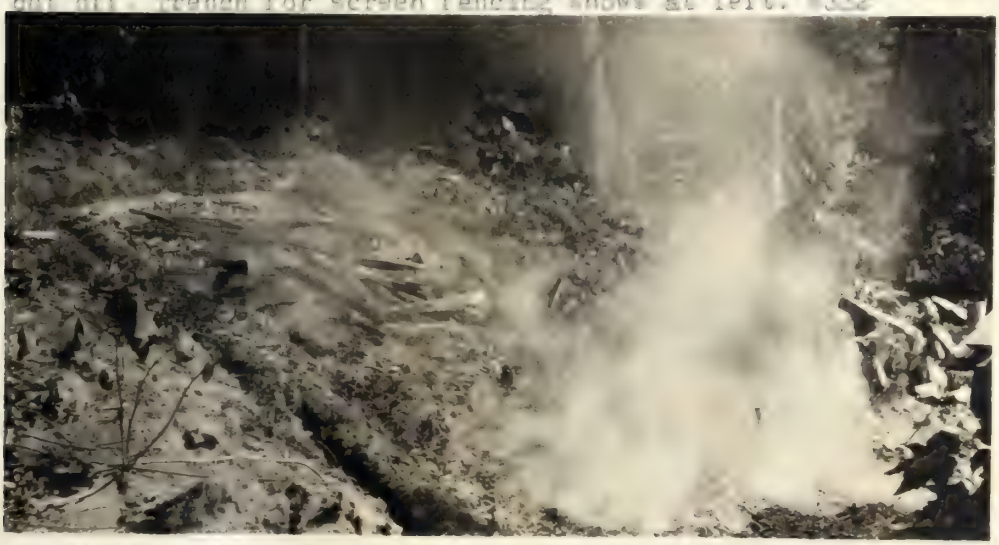
Showing the completed set of plots. The unprotected block is partly hidden by the trees on the right.



Condition when plot was begun. Large R.viscosissimum,apparently dead, at the base of tree. Two square papers mark the extremities of the bush. W3E6



Stump at right is the location of tree in the picture above and marks location of the R.viscosissimum. Plots partly completed. Fence under construction. Burning in progress. Vegetation partly cut off. Trench for screen fencing shows at left. W3J2



Showing trench dug before fires were started. Fires were kept small but were kept going as long as was considered necessary.

W3J0

Gold Hill

Germination

Study

#3



Area in original undisturbed condition, showing the height, density, and character of the ground cover. W328



Plots partially completed. Large stakes for fence supports Small stakes and wire mark actual plot boundaries. Shows vegetation removed from some plots and still standing on adjoining plots. W329.



Completed set of plots. Looking thru the screen fence at the side of the area at the artificially prepared areas beneath the muslin roof. W331



W264 Controlled burns in progress.



W265 Heavy burn on left, light burn in center, duff removal on right. Light burn permitted to burn only for a few minutes.

Pierce

Ger-
mina-
tion

Study

#1

W26



Outside of plot at left. Heavy burn plots in center. Light burn plots at right. Heavy burn continued several hrs.



Light burn plots at extreme left, duff removal plots in center. Artificial skid trail plots extreme right.



W263. Making artificial Skid Trails.

Pierce Germination Study # 1



W 268. Undisturbed Check Plot, showing the original conditions.



W271. 3 artificial skid trails were made through the duff.



W272. View of entire set of plots before they were fence



Area in original undisturted condition. #324



1926 Eradication Camp #1. Dense pole stand having 300 R.lacustre per acre when eradication was done, now following the use of this spot as a campsite has more than 6600 R. lacustre seedlings per acre. #290

VII. Results of 1927 Inspection

The following experimental areas showed no Ribes at the time of the last 1927 inspection:

Area		Region
Cedar Creek	Germination Study #1	St. Joe
Camp D	Germination Study #1	Elk River
Pierce	Germination Study #1	Clearwater
Lakeview	Germination Study #1	Pend Oreille
Lakeview	Germination Study #2	Pend Oreille
Lakeview	Germination Study #3	Pend Oreille
Lakeview	Germination Study #4	Pend Oreille

Four sets of plots showed germination during the same year that they were established. None of the planted R. viscosissimum fruits have yet germinated, all of the new Ribes having been individually checked as of other origin. The results are shown in the following tables:

III. Results of Last Inspection

The following experimental areas showed no Ribes at the time of the last 1927 inspection:

Area		Region
Cedar Creek	Germination Study #1	St. Joe
Camp D	Germination Study #1	Elk River
Pierce	Germination Study #1	Clearwater
Lakeview	Germination Study #1	Pend Oreille
Lakeview	Germination Study #2	Pend Oreille
Lakeview	Germination Study #3	Pend Oreille
Lakeview	Germination Study #4	Pend Oreille

Four sets of plots showed germination during the same year that they were established. None of the planted R. viscosissimum fruits have yet germinated, all of the new Ribes having been individually checked as of other origin. The results are shown in the following tables:

TABLE NO. 3

Summary of Germination Plots Which Showed Positive Results

Type of Disturbance		Meadow Creek Germination Study No. 1				Gold Hill Germination Study No. 1						Gold Hill Germination Study		Total
		Open		Roofed & Fenced		Open		Fenced		Roofed & Fenced		No.2 Fenced& Roofed	No.3 Fenced& Roofed	
		Planted	Not Planted	Planted	Not Planted	Planted	Not Planted	Planted	Not Planted	Planted	Not Planted	Not Planted	Not Planted	
Undisturbed check Plot.		-	-	-	-	5 R.vis.	-	-	-	7 R.vis	1 R.vis.	-	-	13 R.vis.
Upper Layer of Duff Removed		1 R.vis	1 R.vis 2 R.lac	-	1 R.lac.	3 R.vis	57 R.vis.	23 R.vis	39 R.vis.	23 R.vis	36 R.vis.	-	-	183 R.vis 3 R.lac.
All of Duff Removed(mineral soil exposed)		-	-	-	-	-	-	15 R.vis	1 R.vis.	9 R.vis	3 R.vis.	-	-	28 R.vis.
Light Burn (Some duff destroyed)		2 R.lac	-	-	-	15 R.vis	1 R.vis.	23 R.vis	3 R.vis.	28 R.vis	25 R.vis.	2 R.vis.	2 R.vis.	99 R.vis. 2 R.lac.
Medium Burn (Most of duff destroyed		-	-	1 R.lac	8 R.vis 4 R.lac	-	-	-	95 R.vis.	-	-	-	-	103 R.vis 5 R.lac
Heavy Burn (all duff destroyed)		-	-	-	-	-	-	-	1 R.vis.	-	-	9 R.vis.	-	10 R.vis.
Total	R. visc.	1	1	-	8	23	58	61	139	67	65	11	2	436
	R. lac.	2	2	1	5	-	-	-	-	-	-	-	-	10
	All Ribes	3	3	1	13	23	58	61	139	67	65	11	2	446

TABLE NO. 3

Summary of Construction Plots Method Control Sample

Type of Disturbance	Border Crest Construction Study Plot 1						Gully Mitt Construction Study Plot 2						Gully Mitt Construction Study Plot 3						Total
	Open Plain-tained	Open Bot-tomed	Terra-ced Plain-tained	Terra-ced Bot-tomed	Gully Bank Plain-tained	Gully Bank Bot-tomed	Open Plain-tained	Open Bot-tomed	Terra-ced Plain-tained	Terra-ced Bot-tomed	Gully Bank Plain-tained	Gully Bank Bot-tomed	Open Plain-tained	Open Bot-tomed	Terra-ced Plain-tained	Terra-ced Bot-tomed	Gully Bank Plain-tained	Gully Bank Bot-tomed	
Mechanical Disturbance (Plots Number of Sample Plots)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Soil Disturbance (Plots Number of Sample Plots)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Plant Disturbance (Plots Number of Sample Plots)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Total	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	54

TABLE NO. 4

Summary of 1927 Results
of
Gold Hill Germination Study No. 1

(Only complete set of plots showing positive results)

	Undisturbed Check Plot	Surface Duff Removed	Artificial Skid Trails	All Duff Removed	Light Burn of Surface Duff	Heavy Burn
Number Milacres Basis	6	6	*	16	12	6
Total New Ribes Resultant	13 R. vis.	181 vis.	*	28 vis.	192 vis.	1vis.
Average Number R.vis. per Acre	2,167	30,167	*	4,670	16,000	167
Average Number R.lac. per Acre	-	-	*	-	-	-

* No skid trails on these sets of plots.

TABLE NO. 9

Summary of Jury Results
of
Cold Mill Investigation Study No. 1

(Duly complete set of Jurie showing qualitative results)

	Undistributed Check Mill	Heavy-Duty Pencroyd	Artil-ficial Tool & Typelit	All Duty Improved	Light Duty Ma-chine Tool	Heavy Duty
Machine Milacrom Units	6	6	m	6	12	6
Total Time Efficiency	15 M. Wks.	1.05 Wks.	+	.06 Wks.	1.05-1bs.	1.1
Average Number K.Wks. per Wire	6,167	80,167	-	1,673	11,0	1,57
Average Number K.Lbs. Per Wire	-	-	-	-	-	-

* To mark Grain or Phase Rate of Wire.

TABLE NO. 5

Summary of 1927 Results
of
Four Controlled Germination Studies
Which Show Positive Germination

	Undisturbed Check Plot	Surface Duff Removed	Artificial Skid Trails	All Duff Removed	Light Burn of Surface Duff	Heavy Burn
Number Milacres Basis	12	12	*	12	18	12
Total New Ribes Resultant	13 R. vis.	183 R.vis 3 R.lac	*	28 R.vis	196 R.vis. 2 R.lac.	18 vis 5 lac
Average Number R.vis. per Acre	1,083	15,250	*	2,333	10,889	1,500
Average Number R.lac. per Acre	-	250	*	-	111	417

* No skid trails on these plots.

TABLE NO. 5A

Summary of 1927 Results
of
All Controlled Germination Studies

	Undisturbed Check Plot	Surface Duff Removed	Artificial Skid Trails	All Duff Removed	Light Burn of Surface Duff	Heavy Burn
Number Milacres Basis	49	49	36	48	55	49
Total New Ribes Resultant	13 R.vis	183 vis 3 R.lac	-	23 R.vis	196 R.vis. 2 R.lac.	18 vis 5 lac
Average Number R.vis. per Acre	265	3,735	-	583	3,564	367
Average Number R. lac. per Acre	0	61	-	0	41	102

TABLE NO. 5

Summary of 1927 Results
of
Farm Controlled Cooperation Weather
Bride Corn Fighting Determination

	Undistributed (Check Plot	Surface Duff Removed	Artificial Total Yield*	All Duff Removed	Light Burn of Surface Duff	Heavy Burn
Number Villagers Deaths	19	19	*	12	18	19
Total Saw Mills Operating	12 K. vis.	12 Mills 12 Jan.	*	24 K. vis.	18 K. vis. 2 K. Jan.	12 vis. 5 Jan.
Average Number K. vis. per Acre	1,023	18,203	*	2,211	14,189	1,021
Average Number K. Jan. per Acre	-	240	*	-	211	217

* No coal trails on these plots.

TABLE NO. 5A

Summary of 1927 Results
of
All Conviction Determination Verdicts

	Undistributed (Check Plot	Surface Duff Removed	Artificial Total Yield*	All Duff Removed	Light Burn of Surface Duff	Heavy Burn
Number Villagers Deaths	49	49	49	49	41	49
Total Saw Mills Operating	13 K.vis.	13 Mills 2 K.Jan	-	24 K.vis.	126 K.vis. 8 K.Jan.	13vis. 5 Jan
Average Number K.vis. per Acre	305	3,725	-	681	3,894	587
Average Number K. Jan. per Acre	0	81	-	0	41	1.4

The results of the soil acidity investigations are shown in the following table:

TABLE NO. 6

Acidity of Soils

No. of Sample	Tested by	Description of Sample	PH Readings					
			Alluvial Soils		Terrace Soils		Residual Soils	
			Not Burned	Burned	Not Burned	Burned	Not Burned	Burned
1		Gold Hill, decayed basal duff.					6.068	
2		Gold Hill, hot burn						5.941
3		" " Block III No burn.					6.102	
4		Gold Hill " " Hot burn.						6.357
5		Meadow Creek Block I, Plot 5 B before burn.					6.665	
6		Meadow Creek Block I, Plot 5 B after burn.						6.562
7		Meadow Creek Block I, Plot 5 B before burn.					5.722	
8		Meadow Creek Block I, Plot 5 B after burn.						7.006
9		Meadow Creek Block III, Plot 6 B before burn.					6.641	
10		Meadow Creek Block III, Plot 6 B after burn.						6.693
		Lakeview Germination Plots						
11		Block I, Plot A 1 Decayed basal duff			7.442			
12		Block I, Plot A 3 Piled up duff.			6.890			
13		Block I, Plot A4 Mineral soil beneath duff.			7.928			
14		Block I, Plot A 5 Ash, duff, &2½" mineral soil.				7.773		
15		Block I, Plot A 6 Residue after hot burn.				8.531		

Blister Rust Control - University of Idaho

The results of the soil acidity investigations are shown in the following table:

TABLE No. 6

Acidity of Soils

No. of Sam-ple	Pre-pared by	Description of Sample	Alluvial Soils		Terrace Soils		Residual Soils	
			Not Burned	Bur-ned	Not Burned	Bur-ned	Not Burned	Bur-ned
1		Gold Mill, decayed leaf duff.						3.75
2		Gold Hill not burn						7.85
3		" " Woodcliff Ex burn.						5.15
4		Gold Hill " " Not burn.						6.67
5		Meadow Creek Block I, Plot 5 B before burn.					6.65	
6		Meadow Creek Block I, Plot 5 B after burn.						6.58
7		Meadow Creek Block I, Plot 5 B before burn.					5.72	
8		Meadow Creek Block I, Plot 3 B after burn.						7.00
9		Meadow Creek Block III, Plot 6 B before burn.					6.84	
10		Meadow Creek Block III, Plot 6 B after burn.						7.84
		Laboratory Germination Plots						
11		Block I, Plot A 1 Unaged Humal duff				7.44		
12		Plot 1, Plot A 2 Piled 20 days.				6.60		
13		Plot 1, Plot A Mineral soil be-neath duff.				7.19		
14		Plot 1, Plot A 5 inch duff, 4½" min-eral soil.					7.72	
15		Block I, Plot A 6 Heating after hot burn.					6.81	

TABLE NO. 6 (Continued)

No. of Sample	Tested by	Description of Sample	PH Readings					
			Alluvial Soils		Terrace Soils		Residual Soils	
			Not Burned	Burned	Not Burned	Burned	Not Burned	Burned
16		Block III, Plot B 6 mineral soil.			8.086			
17		Binarch Creek, duff from s.slope having Ribes.					5.295	
18		Binarch Creek, mineral soil from S. slope having Ribes					6.943	
19		Lamb Creek, duff from S.slope without Ribes.					4.253	
20		Lamb Creek, mineral soil from S.slope without Ribes.					6.390	
21		Lamb Creek, burned ash and char from S.slope without Ribes.					5.330	
22	University of Idaho	Meadow Creek Burn #1, duff from swamp	6.04					
23		Meadow Creek Burn #1, duff from swamp	6.07					
24		Well water in same bottoms. Boone	6.35					
25		Meadow Creek Burn #1, mineral soil alluvium	6.44					
26		Meadow Creek Burn#1 Upland springwater					6.62	
27		Meadow Creek Burn#1 duff& mineral soil					6.69	
28	Blister Rust Control -	Meadow Creek Burn#1 partly decayed upland duff.					6.76	
29		Meadow Creek Burn #1, duff from alluvium.					7.08	
30		Meadow Creek Burn #1, upland mineral soil-surface.					7.15	
31		Meadow Creek Burn #1, upland mineral soil-deep.					7.15	

TABLE NO. 6 (Continued)

No. of Sample	Textural Type	Description of Sample	Alluvial Soils		Terrace Soils		Residual Soils	
			Not Burned	Burned	Not Burned	Burned	Not Burned	Burned
18		Mixed Till. Plot 3 & mineral soil.			Ashes			
17		Minerok Creek, half from s.slope barley Tiller.					5.3%	
18		Minerok Creek, mineral soil from 3. slope barley Tiller.					6.8%	
19		Lamb Creek, duff from S.slope with oak timber.					4.0%	
20	Clay Loam to Silty Clay Loam	Lamb Creek, mineral soil from S.slope without Timber.					8.3%	
21		Lamb Creek, burned ash and char from S.slope without timber.					6.3%	
22		Meadow Creek Burn #1, duff from swamp		8.0%				
23		Meadow Creek burn #1, duff from swamp		8.0%				
24		Well water in same bottom. Doing		8.3%				
25		Meadow Creek Burn #1, mineral soil Alluvium		8.4%				
26		Meadow Creek Burn Well above swamp					8.3%	
27		Meadow Creek Burn duff & mineral soil					8.0%	
28		Meadow Creek Burn partly decayed wood duff.					8.1%	
29		Meadow Creek Burn #1, duff from alluvium.					7.0%	
30		Meadow Creek Burn #1 mineral mineral soil-texture.					7.1%	
31		Meadow Creek Burn #1, upland mineral soil-texture.					7.2%	

TABLE NO. 6 (Continued)

No. of Sample	Tested by	Description of Sample	PH Readings					
			Alluvial Soils		Terrace Soils		Residual Soils	
			Not Burned	Burned	Not Burned	Burned	Not Burned	Burned
32		Water from Meadow Creek	7.17					
33	University of Idaho Blister Rust Control	Meadow Creek Burn #1, Upland decayed duff.					7.22	
34		Meadow Creek Burn #1, Upland charred ash and mineral soil.						7.25
35		Meadow Creek Burn #1, Upland burned mineral soil.						7.51
36		Meadow Creek Burn #1, Upland slightly charred duff.						7.53
37		Meadow Creek Burn #1, Black ash of heavy duff from alluvium.		7.58				
38		Meadow Creek Burn #1, Upland light burn, (remains charred)						7.84
39		Meadow Creek Burn #1, Upland heavy burn (red mineral soil)						8.41

Samples 1 to 16 inclusive were tested from 1 to 6 weeks after they were collected. Samples 17 to 21 were tested about 1 year after they were collected. Samples 22 to 39 were tested as they were collected.

TABLE NO. 6 (Continued)

No. of Sample	Tested by	Description of Sample	pH Readings					
			Alluvial Soils		Terrace Soils		Peatland Soils	
			Not Burned	Burned	Not Burned	Burned	Not Burned	Burned
32	Univ. of Idaho	Water from Meadow Creek	7.17					
33		Meadow Creek Burn #1,Upland Severed Soil.					7.22	
34		Meadow Creek Burn #1,Upland charred ash and mineral soil.						7.22
35		Meadow Creek Burn #1,Upland burned mineral soil.						7.81
36		Meadow Creek Burn #1,Upland slightly charred duff.						7.55
37	Burt Cottrell	Meadow Creek Burn #1,Black ash of heavy duff from slash burn.		7.65				
38	Bitterroot	Meadow Creek Burn #1,Upland light burn.(remains charred)						7.84
39		Meadow Creek Burn #1,Upland heavy burn (red mineral soil)						8.41

Samples 1 to 16 inclusive were tested from 1 to 8 weeks after they were collected. Samples 17 to 31 were tested about 1 year after they were collected. Samples 32 to 39 were tested as they were collected.

VIII. Summary

The experiment already shows that viable seeds of R. viscosissimum and R. lacustre are present in the basal portion of the duff, and that they will germinate under some conditions.

The experiment shows that severe ground fire kills these stored Ribes seeds, and that either a light ground fire or a mechanical disturbance of the duff results in the germination of these seeds.

The experiment shows that the conditions on undisturbed check plots do not permit the germination of Ribes seeds. (The germinations which occurred on check plots in 1927 were unmistakably the result of duff disturbance by our field men. In other words, they are not truly checks.)

The experiment further shows that germination may occur within 60 days after the duff conditions are changed, and that the season of the year is instrumental only in so far as it affects the fundamental factors which control germination.

The results indicate that soil acidity is of minor importance, if any, regarding the germination of Ribes seeds.

The experiment shows that the Ribes seeds are mostly in the extreme basal duff.

It further indicates that rodents and birds play a minor part in the distribution of Ribes seeds.

The evidence indicates that the slightest disturbance of the duff may result in some Ribes germination from stored seed. The removal or destruction of most of the duff results in more new Ribes than any other artificial treatment yet tried.

VIII. Summary

THE RESULTS OF DUFF DISTURBANCE

I. Definition of the Experiment

This experiment is a systematic study of forest areas within which outside activities have disturbed the normal life of the forest. It may be due to fire, logging, road-building, insect infestation, or to any other factor which upsets the natural balance. The study is divided into three distinct points of attack.

Disturbance by fire is outstanding because of the large acreage which is affected in this manner.

Mechanical disturbance of the duff results from logging operations, from all building and construction work, and similar activities.

Disturbance of the shade canopy without disturbance of the duff may result from slashing of the forest cover without later disturbance and may also occur on areas denuded by insect or fungus infestations.

The establishment, survival and growth of these Ribes is a secondary phase of this study. It will be continued as long as deemed advisable.

II. Description of Basis Used in Selecting Experimental Units

Records were obtained from the Forest Service, and from the several timber protective associations, of areas burned by fires during the past 30 years. These burned areas were drawn to scale on maps of the several forested areas. Records of logged areas were also obtained, for studies on disturbances of that character. Areas with the timber killed but not removed were also searched for.

Considering their accessibility and regional locations, a certain number of the smaller of these disturbed areas were designated as study areas. This was done with the intention of sampling various conditions found in the white pine belt of Idaho. Studies were made in the Kaniksu, Pend Oreille, Coeur d'Alene, St. Joe and Clearwater regions.

III. Methods of Study

Systematic efforts were made to locate the designated areas, but only a part of these areas were located after careful searching. All of the designated burns which were found were carefully mapped to scale, showing the boundaries of the burned area and of the different sets of conditions resulting therefrom. On all burns which cover less than

I. Definition of the Experiment

This experiment is a systematic study of forest areas within which outside activities have disturbed the normal life of the forest. It may be due to fire, logging, road-building, insect infestation, or to any other factor which upsets the natural balance. The study is divided into three distinct points of attack.

Disturbance by fire is outstanding because of the large acreage which is affected in this manner.

Mechanical disturbance of the duff results from logging operations, from all building and construction work, and similar activities.

Disturbance of the shade canopy without disturbance of the duff may result from slashing of the forest cover without later disturbance and may also occur on areas denuded by insect or fungus infestations.

The establishment, survival and growth of these Pines is a secondary phase of this study. It will be continued as long as deemed advisable.

II. Description of Plots Used in Selecting Experimental Units

Records were obtained from the Forest Service, and from the several timber protective associations, of areas burned by fires during the past 30 years. These burned areas were drawn to scale on maps of the several forested areas. Records of logged areas were also obtained, for studies on disturbance of that character. Areas with the timber killed but not removed were also searched for.

Considering their accessibility and regional locations, a certain number of the smaller of these disturbed areas were designated as study areas. This was done with the intention of sampling various conditions found in the white pine belt of Idaho. Studies were made in the Kaniksu, Pend Oreille, Coeur d'Alene, St. Joe and Clearwater regions.

III. Methods of Study

Systematic efforts were made to locate the designated areas, but only a part of these areas were located after careful searching. All of the designated burns which were found were carefully mapped to scale, showing the boundaries of the burned area and of the different sets of conditions resulting therefrom. On all burns which cover less than

1/4 acre, a search for Ribes covering the entire area was made by covering the ground at close intervals in crew formation. On areas larger than 1/4 acre, one or more sample strips were run through the area, sufficient to give a representative picture of conditions on the whole area.

Areas disturbed in other ways were likewise designated, searched for, and examined.

A two-man crew has been continuously used for this work.

During the season of 1926, a one-rod width of strip was first used, but this was later changed to 1/2-rod width of strip, after the former was found to be too wide for most efficient work by a two-man crew.

In 1927, the width of all new strips was made 6.6 feet (milacre) to further facilitate the compilation of data. Each Ribes plant was numbered and its location represented on the map.

IV. Plan for Recording Data

The data taken for each Ribes and for its association is shown on Form WF #36. In case no detailed strip study of the area was made, the area was recorded on Form WF #35.

V. Plot Index

Study areas are listed only under "VII. Results of 1927 Inspection".

VI. Individual Area Description

A detailed description of each individual area studied is not included. The outstanding features of each area are given in connection with the tabulated list of areas on succeeding pages.

VII. Results of 1927 Inspection

A. Fire Disturbance

In cooperation with the Priest River Experiment Station, several hundred controlled plots on burned areas were examined for Ribes. These will be reported upon at the end of 1928.

1/4 acre, a search for Ribes covering the entire area was made by covering the ground at close intervals in crew formation. On areas larger than 1/4 acre, one or more sample strips were run through the area, sufficient to give a representative picture of conditions on the whole area.

Areas disturbed in other ways were likewise designated, searched for, and examined.

A two-man crew has been continuously used for this work.

During the season of 1926, a one-rod width of strip was first used, but this was later changed to 1/2-rod width of strip, after the former was found to be too wide for most efficient work by a two-man crew.

In 1927, the width of all new strips was made 8.6 feet (miacre) to further facilitate the compilation of data. Each Ribes plant was numbered and its location represented on the map.

IV. Plan for Recording Data

The data taken for each Ribes and for its association is shown on Form WP #86. In case no detailed strip study of the area was made, this area was recorded on Form WP #85.

V. Plot Index

Study areas are listed only under "VII. Results of 1927 Inspection".

VI. Individual Area Description

A detailed description of each individual area studied is not included. The outstanding features of each area are given in connection with the tabulated list of areas on succeeding pages.

VII. Results of 1927 Inspection

1. Fire Distribution

In cooperation with the Priest River Experiment Station, several hundred controlled plots on burned areas were examined for Ribes. These will be reported upon at the end of 1928.

TABLE NO. 7

Fire Disturbance in Kaniksu Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Thama Mt. Burn #1	28	56N	4W	100-120	Reconn	-	Fire	-
" " " #2	28	56N	4W	100-120	.004	-	"	24,750 vis.
Terrace Area #1 Hoodoo Burn #1	2	55N	4W	40-60	Reconn	-	"	Medium visco-sissimum
North slope Area #2 " "	2	55N	4W	40-60	"	-	"	" " Some lac.
Terrace Area #3 " "	2	55N	4W	60-80 20-40	"	-	"	Med. vis.
Terrace Area #4 " "	11	55N	4W	80-100 20-40	"	-	"	-
N. slope Area #5 " "	2	55N	4W	40-60	"	-	"	Med. vis.
Larson Hill Burn	22	59N	5W	20-40	.011	-	"	-
Quartz Cr.Burn Strip #1		58N	4-5W	200 +	.010	-	"	15,250 vis.
" " " Strip #2		58N	"	200 +	.043	-	"	9,511 vis.
" " " Strip #3		58N	"	200 +	.010	-	"	5,400 vis.
Quartz Cr. Burn	13 24	58N	5W	200 + 80-100	Reconn	-	"	-
" " "	18	58N	4W	80-100	"	-	"	Med. vis.
" " "	20	58N	4W	120-140 60-80	"	3 vis	"	" "
" " "	2	57N	5W	160-200 40-60	"	-	"	" "
" " "	2	57N	5W	200 + 100-120	"	-	"	Many vis.
" " "	36	58N	5W	40-60	"	-	"	Med. vis.
" " "	36	58N	5W	160-200 80-100	"	-	"	Many vis.
Quartz Creek Burn	23	55N	5W	120-160	Reconn	-	Fire Trench	Med. visco. Med. lac.
" " "	15 22	53N	5W	120-160	"	-	"	Med. visco.
" " "	10	52N	5W	200+	"	-	Fire	Med. lac.
Lakeview Mt. Burn Strip #2	27	61N	5W	40-60	.000	-	"	550 vis. 1,388 lac.

TABLE NO. 7

Tree Literature in Hawkins Region

Location				Orig-inal Timber Age Class	Average of Sta-tured Area	Trees per A. Sta-tured	Type of Dis-ease	Trees per Acre Following Dis-ease
Locality	S	T	R					
Thorne Mt. Farm #1	31	SSW	4W	100-120	Decorum	-	Fire	-
" " " #2	28	SSW	4W	100-120	.004	-	"	24,750 via.
Terrace Area #1 Meadow Farm #1	2	SSW	4W	40-80	Decorum	-	"	Heating via-riation
North slope Area #4 " "	3	SSW	4W	40-80	"	-	"	Type Inc.
Terrace Area #3 " "	8	SSW	4W	80-100 80-40	"	-	"	Dec. via.
Terrace Area #5 " "	11	SSW	4W	80-100 80-40	"	-	"	-
E. slope Area #5 " "	3	SSW	4W	40-80	"	-	"	Ded. via.
Larson Hill Farm	29	SSW	5W	80-40	.011	-	"	-
Quarter Cr. Farm Strip #1		SSW	5W	200 +	.010	-	"	14,000 via.
" " " Strip #2		SSW	5W	200 +	.042	-	"	5,815 via.
" " " Strip #3		SSW	5W	200 +	.010	-	"	6,400 via.
Quarter Cr. Farm	24	S.W	6W	200 + 80-100	Decorum	-	"	-
" " "	14	NW	4W	80-100	"	-	"	Med. via.
" " "	24	SSW	4W	120-140 80-80	"	-	"	-
" " "	2	SSW	5W	150-200 40-80	"	-	"	-
" " "	3	SSW	4W	200 + 100-120	"	-	"	Many via.
" " "	24	SSW	4W	40-80	"	-	"	Med. via.
" " "	26	SSW	4W	120-200 80-120	"	-	"	Many via.
Quarter Cross Farm	17	SW	4W	120-180	Decorum	-	Fire	Med. vicco. Med. Inc.
" " "	25	SSW	4W	120-140	"	-	"	Med. vicco.
" " "	19	SSW	4W	200+	"	-	"	Med. Inc.
Lacerlov Mt. Farm Strip #4	27	SW	4W	40-80	.010	-	"	I SSW Inc.

TABLE NO. 7 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Lakeview Mt. Burn Steep Hillside	1-2	60N	5W	120-160 20-40	Reconn.	-	Fire	-
Lakeview Mt. Burn Level Area	1-2	60N	5W	120-160 20-40	"	-	"	-
Lakeview Mt. Burn Moist sites	35-36	61N	5W	120-160 20-40	"	-	"	Few visco. Many Lac.
" " "	6	60N	4W	0-10	"	-	"	-
Hungry Creek Burn	28	Wash. 36N	45E	60-80	"	-	"	Few visco. Few Lac.
Bath Creek Burn #1	36	36N	"	200 +	"	-	"	
Kalispell Rock Burn	9-15 16	36N	"	200 +	"	-	"	Med. visco
Mush Creek Burn	27 34	36N	"	60-80	.05	-	"	180 visco. 20 lac.
Lamb Creek Burn	14-15 16	Idaho 60N	5W	120-160	Reconn.	-	"	Few Lac.
Burn S. of Kalispell Creek.	11	60N	4W	100-120	"	-	"	" "
Hanna Cr. Sales Area	10-11	60N	4W	100-120	"	-	"	Very few lacustre
Granite Creek Burn	13-14	Wash. 37N	45E	20-40	"	-	"	" "
" " "	14	37N	"	160-200	"	-	"	-
" " "	23	37N	"	60-80 20-40	"	-	"	-
Granite Creek Burn	14	37N	"	0-10	Reconn.	Few lac	Fire	Few lacustre
" " "	36	37N	"	10-20 0-10	"	" "	"	Many visco.
" " "	36	37N	"	0-10	"	" "	"	Med. Lacustre " vis.
" " "	25-36	37N	"	200+	"	-	"	Few lac.
" " "	22	37N	"	20-40	"	-	"	Med. vis.
" " "	22	37N	"	200+	.001 Reconn.	- -	" "	34,000 vis.

TABLE NO. 7 (Continued)

Locality	Location S	T	R	Original Timber Area Planted	Average Distance of Timber Harvested	Fiber Per A. Before Thinning Brings	Type of Timber Purchased	Fiber Per Acre Following Thinning
Lakeview Mt. Turn Steep Hillside	1-2	COM	SW	120-160 30-40	Uneven.	-	Fire	-
Lakeview Mt. Burn Level Area	1-2	COM	SW	120-160 30-40	"	-	"	-
Lakeview Mt. Burn Moist sites	36-16	SLM	SW	120-160 30-40	"	-	"	Not virgin. Fire red.
" " "	8	COM	SW	0-10	"	-	"	-
Sandy Creek Burn	28	SSW	SW	Var. 80-90	"	-	"	Few virgin. Few leg.
Rich Creek Burn #1	28	SSW	"	200 +	"	-	"	-
Tallapoil Rock Burn	5-7 15 16	SSW	"	300 +	"	-	"	Most virgin.
Rock Creek Burn	27 34	NEW	"	60-80	.05	-	"	160 virgin. 80 leg.
Sand Creek Burn	1-4 Cabin 15 16	NEW	SW	120-160	Uneven.	-	"	Few leg.
Burn E. of Tallapoil Creek.	11	SSW	W	100-120	"	-	"	" " "
Thomas Cr. Pines Area	1-2 11	SSW	W	120-160	"	-	"	Very few virgin
Dramalie Creek Burn	13-14	SSW	W	Open. 80-90	"	-	"	" " "
" " "	14	SSW	"	120-160	"	-	"	-
" " "	24	SSW	"	80-90 20-30	"	-	"	-
Dramalie Creek Burn	14	SSW	"	0-10	Uneven.	Few	Fire	Few leg.
" " "	22	SSW	"	10-20 0-10	"	" "	"	Many virgin.
" " "	25	SSW	"	0-10	"	" "	"	Med. virgin.
" " "	26-27	SSW	"	300+	"	-	"	Few leg.
" " "	28	SSW	"	20-40	"	-	"	Med. virg.
" " "	29	SSW	"	300+	.01	-	"	Few leg.

TABLE NO. 7 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Granite Creek Burn	22	37N	45E	200 +	.002 Reconn.	-	Fire	16,000 viscosis.
" " "	21	37N	45E	200 +	"	-	"	-
" " "	21	37N	45E	200 +	.0125 Reconn.	-	"	880 vis
" " "	20	37N	45E	200 +	.0005 Reconn.	-	"	600,000 lac.
Zero Creek Burn	17	Idaho 62N	6W	200 + 10-20	Reconn.	Few vis Few lac	"	Many vis Few lac.
Zero Creek Old Burn	17-20	62N	6W	10-20	Reconn.	Many visc. Very few lac	No recent fire	Same
Packer Creek Burn	17-20	62N	6W	120-160 20-40	"	Many visc.	Fire	Many visc.
Zero Creek Burn	20	62N	6W	80-100	.001 Reconn.	-	"	100,000 visc.
" " "	8	62N	6W	10-20	"	-	"	Few lac.
" " "	8	62N	6W	200+	"	-	"	-
" " "	8	62N	6W	?	"	-	"	Few vis.
" " "	6-5-4	62N	5W	0-10	"	Med.vis few lac	"	Many vis. V.few lac.
Beaver Burn #5 Zero Creek Burn	5	62N	5W	80-100 0-10	Reconn.	Few lac.	"	Med.vis. V.few lac
Beaver Burn #6 " " "	1	62N	5W	120-160	"	-	"	Many lacustre
Beaver Burn #7 " " "	1	62N	5W	200+	"	-	"	-
Beaver Burn #8 " " "	6-7-8	62N	4W	200+	"	-	"	-
Strip #1 Lakeview Mt. Burn	26	61N	5W	100-200+	.030	-	"	333 vis.
Strip #3 " " "	26	61N	5W	40-60	.004	-	"	200 vis. 600 lac.
East Fork 1920 Burn Upper Priest River	13	65N	5W	120-160	7.00	-	"	7,756 lac.
Reeder Creek Burn	24-30	61N	5-4W	0-10	Reconn.	-	"	-
" " "	19	61N	4W	20-40	"	-	"	V.few lac
" " "	24	61N	5W	120-160 10-20	"	-	"	-
" " "	19-25 30	61N	4W 5W	20-40	"	-	"	Few lacustre

TABLE NO. 7 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Reeder Creek Burn	19-30-31	61N	4W	40-60	Reconn.	-	Fire	-
Quartz Creek Burn	30	58N	4W	40-60 20-40	"	Few visco.	"	Medium viscosis.
" " "	30	58N	4W	160-200	"	Few lac	"	Few lac.
" " "	30-31	58N	5W	80-100	"	-	"	Med.vis. V.few lac.
" " "	31	58N	4W	0	"	-	"	few vis. " lac.
" " "	25	58N	5W	100-120 20-40	"	-	"	Many viscosis.
" " "	25	58N	5W	100-120	"	-	"	" " Med.lac.
" " "	30	58N	4W	40-60 20-40	"	Few vis "lac.	Fire "	Many vis. Few lac.
" " "	30	58N	4W	40-60 20-40	.010	Med. vis.	"	900 viscos.
" " "	24	58N	4W	160-200	Reconn.	-	"	Few lac.
" " "	1	57N	5W	200+ 40-60	"	Few lacust.	"	Many lacustre
" " "	6-1	57N	4W 5W	100-120 40-80	"	-	"	Many vis. " lac.
" " "	1	57N	5W	100-120 40-80	.030	-	"	2,700 vis 1,233 lac
" " "	6	57N	4W	200+ 20-40	Reconn.	-	"	Many vis Few lac.
" " "	6	57N	4W	200+ 20-40	.010	-	"	1,520 vis 200 lac.
" " "	1	57N	5W	160-200	.002	-	"	48,500 viscos.
Planted Plot A Upper Priest River	Unsurveyed			200+	.00025	-	Heavily Burned	16,000 Lacustre
Planted Plot B Upper Priest River		"		200+	.00025	-	Med. Burn	100,000 Lacustre
Planted Plot C Upper Priest River		"		200+	.00025	-	light Burn	8,000 viscosis.
Planted Plot D Upper Priest River		"		200+	.00025	-	light Burn	28,000 viscosis

TABLE NO. 7 (Continued)

Locality	Location				Geological Age Class	Average No. of Individuals	Average per cent Deformed	Fibers per cent Tubercles	Type of Tubercles	Fibers per Area
	S	T	R							
Beaver Creek Dam	13	61N	6W	4 S-SO	Permian	-	-	Flat	-	
Quarter Creek Dam	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" " "	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Planted Plot 1 Upper Prairie River	Unsurveyed			.00Mi	-					
Planted Plot 2 Upper Prairie River	"			.00Mi	-					
Planted Plot 3 Upper Prairie River	"			.00Mi	-					
Planted Plot 4 Upper Prairie River	"			.00Mi	-					

TABLE NO. 7 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Planted Plot E Upper Priest River	Unsurveyed			200+	.00025	-	Light Burn	-
Planted Plot F Upper Priest River		"		200+	.00025	-	"	40,000 lacustre
Average per acre					7.3125			168.3 lac 7111.9 vis

Note: Areas without definite acreage and number of Riber per acre stated in above table are not included in the above average.

TABLE NO. 7 (Continued)

Location				Original Number of Sites	Average Area Enclosed	Sites per A. Before Sur-face	Type of Sur-face	Sites per Acre Following Sur-face
Locality	S	T	R					
Planted Plot B	Unsurveyed						Light	
Upper Priest River				200+	.0025%	-	Burn	-
Planted Plot F								40,000
Upper Priest River		"		200+	.0025%	-	"	Locusts
Average per acre					2.81%			168.8 Ins Fill Area

Note: Areas without definite acreage and number of Sites per acre stated in above table are not included in the above average.

TABLE NO. 8

Fire Disturbance in Lakeview Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Strip #1 Lakeview Burn # 1	9	53N	1W	40	.010	-	Fire	9,667 viscosiss.
Strip #2 " "	"	"	"	40	.010	-	"	3,000 viscosiss.
Strip #3 " "	"	"	"	40	.005	-	"	85,000 viscosiss.
Strip #4 " "	"	"	"	40	.007	-	"	3,428 viscosiss.
Strip #4 " "	"	"	"	40	.003	-	Fire Trench	2,000 viscosis.
Strip #5 " "	"	"	"	40	.001	-	"	93,000 visco.
Strip #5 " "	"	"	"	40	.005	-	Fire	63,400 visco.
Strip #6 " "	"	"	"	40	.008	-	"	15,250 visco.
" " Strip #7	"	"	"	40	.0005	- -	Fire Trench	276,000 visco.
" " " "	"	"	"	40	.018	-	Fire	17,222vis
Strip #8 Lakeview Burn #2	8	53N	1W	40	.025	-	"	2,160 vis. 120 iner.
Strip #1 Cedar Creek Fire	35	54N	1W	Mixed	.027	-	"	16,963 viscosis.
Burn #1 Lakeview Cutover Area # 1	9	53N	1W	40	0.004	-	Burning of Brush Pile	1,750 vis
" " Burn#2	"	"	"	40	.004	-	"	4,350 vis.
" " Burn#3	"	"	"	40	.004	-	"	6,250 vis.
" " Burn#4	"	"	"	40	.006	-	"	2,500 vis.
" " Burn#5	"	"	"	40	.006	-	"	2,667 vis.
" " Burn#6	"	"	"	40	.005	-	"	6,000 vis.
" " Burn#7	"	"	"	40	.001	-	"	2,000 vis.
" " Burn#8	"	"	"	40	.004	-	"	7,250 vis.

TABLE NO. 8

Fire Disturbance in Lakeview Region

Location				Original Number of Disturbed Trees	Average Area Burned	Miles per A. Before Distur- bance	Type of Distur- bance	Miles per Volum- ing Tim- burbance
Locality	S.	T.	R.					
Strip #1 Lakeview Burn # 1	8	SW	1W	40	.010	-	Fire	3,637 vicarious.
Strip #2 " " "	"	"	"	40	.010	-	"	3,000 vicarious.
Strip #3 " " "	"	"	"	40	.005	-	"	85,000 vicarious.
Strip #4 " " "	"	"	"	40	.007	-	"	3,... vicarious.
Strip #4 " " "	"	"	"	40	.008	-	Mine Tresmb	2,000 vicarious.
Strip #5 " " "	"	"	"	40	.021	-	"	83,000 vicaro.
Strip #5 " " "	"	"	"	40	.105	-	Fire	68,400 vicaro.
Strip #6 " " "	"	"	"	40	.006	-	"	1,... vicaro.
" " Strip #7	"	"	"	40	.0038	- Tremb	Fire	278,000 vicaro.
" " " "	"	"	"	40	.014	-	Mine	17,222 vica
Strip #8 Lakeview Burn #2	8	SW	1W	40	.083	-	"	1,... vicar.
Cedar Creek Fire Strip #1	25	SW	1W	Virgin	.017	-	"	16,... vicario.
Burn #1 Lakeview Gulch Area # 1	8	SW	1W	40	1.208	-	Burn- ing of Brush Pile	1,750 vica
" " Burn #2	"	"	"	40	.206	-	"	4,880 vica.
" " Burn #3	"	"	"	40	.076	-	"	8,880 vica.
" " Burn #4	"	"	"	40	....	-	"	1,000 vica.
" " Burn #5	"	"	"	40	.008	-	"	1,817 vica.
" " Burn #6	"	"	"	40	.000	-	"	4,100 vica.
" " Burn #7	"	"	"	40	.021	-	"	1,... vica.
" " Burn #8	"	"	"	40	.004	-	"	7,... vica.

TABLE NO. 8 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Burn #9 Lakeview Cutover Area # 1	9	53N	1W	40	.004	-	Burning of Brush File	8,250 viscosis.
" " Burn #9A	"	"	"	40	.001	-	"	4,000 vis.
" " Burn #10	"	"	"	40	.004	-	"	2,500 vis.
" " Burn #11	"	"	"	40	.004	-	"	3,000 vis.
Plot 1-8 Lakeview Burn #1	"	"	"	40	.008	-	Fire	5,750 vis. 125 lac.
Cape Horn (In draw N.E. slope)	30	54N	"	100-200	Reconn.	-	"	Many viscosiss.
Cape Horn (On N. E. Ridge)	"	"	"	100-200	"	-	"	Many viscosiss.
Average per Acre					.173			12,171 vis 6 lac. 18 iner.

TABLE IV.—I (continued)

Location				Original Value	Average Value	Times Increased	Type of Insulation	Ribbon Description
Location								
Barn #3 Interview Observer Area #3	3	Yes	Ly	40	.004	-	Burnished Burrs Paint	8,340 visuals.
" " Barn #10	"	"	"	#)	.001	-	"	-8,000 vis.
" " Barn #10	"	"	"	#)	.004	-	"	1,520 vis.
" " Barn #11	"	"	"	40	.004	-	"	1,220 vis.
Job 3-8 Interview Barn #1	"	"	"	40	.004	-	Tube	1,740 vis. 1,140 les.
Cape Horn (lt Crow N.E. Alone)	#)	Yes	"	100-150	Unknown.	-	"	Many visuals.
Cape Horn (on E. W. Tube)	"	"	"	100-200	"	-	"	Many visuals.
Average per Area					.172			12,113 vis. 8 loc. 1,8 les.

TABLE NO. 9

Fire Disturbance in Harvard Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Gold Hill Germination Study #1	20	42N	3W	40	.006	-	Controlled Light Burn	15,833 viscosissimum.
" " " "	"	"	"	40	.006	-	Con. Med. Burn	15,833 viscosissimum.
" " " "	"	"	"	40	.006	-	Con. Hot Burn	167 viscosiss.
Meadow Creek Germination Study #1	14	"	"	160-200	.004	-	Con. light Burn	500 lacustre
" " " "	"	"	"	160-200	.004	-	Con. Med. Burn	2,000 vis. 1,250 lac.
Gold Hill Germination Study #2	20	"	"	160-200	.001	Ribes brought by mining development 20 yrs. past. Timber has no Ribes	Con. light Burn	2,000 visco.
" " "	"	"	"	160-200	.001		Con. Heavy Burn	9,000 visco.
Meadow Creek Strip D	14	"	"	100-160	.00875	-	Fire	4,650 vis.
" " Strip E	"	"	"	100-160	.00775	-	"1924	11,464vis 2,194 lac
" " " "	"	"	"	100-160	.001125	-	"1925	889 vis 5,333 lac
" " Strip #1	"	"	"	100-160	.0175	-	Fire Trench	514 vis 171 lac
" " "	"	"	"	100-160	.1365	-	Fire	1,619 vis 490 lac 7 inm

TABLE NO. 8

Fire Resistance in Burned Piling

Location				Orientation of Piling	Average Distributed Area Treated	Miles per A. Centre Distribution	Type of Distribution	Time per Acre Fully Treated
Locality								
Gold Hill Reservation Study #1	20	400	NW	40	.020	-	Concentrated light burn	18,812 Vicinity.
" " " "	"	"	"	40	.020	-	Con. Med. Burn	13,804 Vicinity.
" " " "	"	"	"	40	.004	-	Con. Not Burn	3,87 Vicinity.
Meadow Creek Observation Study #1	14	-	"	160-200	.004	-	Con. Light Burn	2,30 Vicinity
" " " "	"	"	"	150-200	.004	-	Con. Med. Burn	2,000 Vicinity.
Gold Hill Observation Study #2	20	"	"	150-200	.001	Three Straight Pyramiding developments	Con. Light Burn	2,000 Vicinity.
" " "	"	"	"	150-200	.001	20 Pre. Past. Timber Due on Ridge	Con. Heavy Burn	2,000 Vicinity.
Meadow Creek Strip 1	14	"	"	100-150	.004	-	Con. Light Burn	1,615 Vicinity
" " Strip 2	"	"	"	100-150	.004	-	Con. Med. Burn	1,210 Vicinity
" " "	"	"	"	100-150	.004	-	Con. Not Burn	302 Vicinity
" " Strip #1	"	"	"	100-150	.004	-	Con. Light Burn	1,615 Vicinity
" " "	"	"	"	100-150	.004	-	Con. Med. Burn	1,210 Vicinity

TABLE NO. 9 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Meadow Creek Strip S B 1	14	42N	3W	100-160	.003	-	Ground cover only burned off	-
" " Strip S A 1	"	"	"	100-160	.0705	-	Fire	667 vis. 866 lac
" " Strip C	"	"	"	100-160	.003	-	Fire Trench	1,333 vis 2,000 lac
" " Strip C	"	"	"	100-160	.1345	-	Fire	883 vis 452 lac 14 iner
Hog Meadow #1 Strip # 1	3	40N	1W	100-160	.026	-	" 1925	308 vis.
" " " "	"	"	"	100-160	.016	-	Fire 1926	250 vis
Meadow Creek # 1 1927 Strip #1	14	42N	3W	100-160	.004	-	Fire	750 vis. 2,500 lac.
Meadow Creek # 1 1927 Strip #2	"	"	"	100-160	.006	-	"	1,500 vis. 3,000 lac.
Meadow Creek # 1 1927 Strip #3	"	"	"	100-160	.008	-	"	1,000 lac.
Meadow Creek # 1 1927 Strip #4	"	"	"	100-160	.0055	-	"	1,073 vis. 1,073 lac.
Meadow Creek # 1 1927 Strip #5	"	"	"	100-160	.008	-	"	750 lac.
Meadow Creek # 1 1927 Strip #10	"	"	"	100-160	.031	-	"	871 vis. 1,645 lac.
Meadow Creek # 1 1927 Strip #10	"	"	"	100-160	.052	-	Ground Fire only	1,365 vis. 923 lac.
Gold Hill Spot Burn Strip A	20	"	"	40	.012	-	Fire	4,583 vis.
" " " " Strip B	"	"	"	40	.017	-	"	13,941 vis
Boone Cutting Area #1	7	42N	2W	120+	.026	-	"	4,192 lac
" " Area #2 Strip #1	7	"	"	100-200	.007	-	"	1,429 lac.
" " Strip #2	7	"	"	100+	.020	-	Brush Fire	34,000 lac 1,500 vis
" " Strip #3	7	"	"	100-120	.015	-	Brush Fire	5,867 lac.

TABLE NO. 5 (Continued)

Location				Original Timber Age Class	Average of Diameter turned Trees Inches	Trees per A. before Treatment	Trees Type of Timber Trees	Trees per Acre following Treatment
Locality	S	T	R					
Meadow Creek Strip 3 & 1	24	42N	W	100-160	.00S	-	Ground cover only harmed off	-
" " Strip 3 & 1	"	"	"	100-160	.0700	-	Fire	852 Trees 158 Inc
" " Strip C	"	"	"	100-160	.00S	-	Fire Trees	1,885 Trees 5,000 Inc
" " Strip C	"	"	"	100-160	.1145	-	Fire	862 Trees 445 Inc Inches
Dog Meadow #1 Strip # 1	3	40N	W	100-160	.058	-	Fire	804 Trees 1838
" " " " "	"	"	"	100-160	.016	-	Fire	1350 Trees 1838
Meadow Creek # 1 1827 Strip #1	14	42N	SW	100-160	.004	-	Fire	750 Trees 3,800 Inc.
Meadow Creek # 1 1827 Strip #2	"	"	"	100-160	.00S	-	"	1,800 Trees 1,000 Inc.
Meadow Creek # 1 1827 Strip #3	"	"	"	100-160	.00S	-	"	1,000 Inc.
Meadow Creek # 1 1827 Strip #4	"	"	"	100-160	.000S	-	"	1,072 Trees 1,072 Inc.
Meadow Creek # 1 1827 Strip #5	"	"	"	100-160	.00S	-	"	750 Inc.
Meadow Creek # 1 1827 Strip #10	"	"	"	100-160	.021	-	"	1,645 Trees 174 Trees
Meadow Creek # 1 1827 Strip #10	"	"	"	100-160	.07S	-	Ground Fire only	1,185 Trees 485 Inc.
Rock Hill Trail Burn Strip A	30	"	"	40	.01S	-	Fire	4,800 Trees
" " " "								
Strip B	"	"	"	40	.01Y	-	"	12,240 Trees
Moore Cutting Area#	7	42N	W	130+	.0S3	-	"	1,160 Inc
" " Area#2 Strip A	7	"	"	100-130	.0S7	-	"	1,250 Inc
" " Strip B	7	"	"	130+	.0S0	-	Fire	1,800 Trees 84,000 Inc
" " Strip C	7	"	"	100-130	.0S	-	Ground Fire	5,887 Trees Inc.

TABLE NO. 9 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Oviat Burn # 1	1	39N	1E	120-160	.282	-	Gr. cover slightly burned in places Timber unburned	-
" " "	"	"	"	120-160	.025	-	Upturn and Fire Trench	80 vis.
" " # 2	6	39N	2E	120-160	.0025	-	Fire Trench	30,165 vis 731 lac
" " "	6	39N	2E	120-160	.057	-	Fire	5,732 vis. 17 lac.
Strip #1 Emida Burn #1	20 21	43N	2W	160-200	1.355	-	"	34 vis. 17 lac.
Plot #1 Emida Burn #1	21	43N	2W	160-200	.100	-	"	40 vis. 170 lac.
Meadow Creek Burn #2	11	42N	3W	30	.009	-	"	36,000 vis. 1,030 lac.
East Fork Potlatch Burn #1	6	40N	1E	120-160	.039	-	"	1,051 vis. 308 lac.
" " " #2 Strip #2	6	40N	1E	120-160	.0075	-	"	2,000 vis. 133 lac.
Average per acre					2.464125			834.1 vis. 928.2 lac. 1.2 iner.

TABLE NO. 9 (Continued)

Location				Original Timber Age Classes	Average Area Studied	Mikes per A. Before Mikes Surveyed	Type of Fire-fighting Surface	Mikes per Acre Fire-fighting Surface
Locality	S	T	N					
Cruet Burn # 1	1	32W	1S	120-160	.282	-	Ox-cover silty ly burned in pieces Tim-ber un-burned	-
" " "	"	"	"	120-160	.085	-	Up-turn and Fire Trench	80 yds.
" " " # 2	6	72W	2T	120-160	.0854	-	Fire Trench	620.1 yds 720.1 lbs.
" " "	6	32W	2T	120-160	.047	-	Fire	4,720 yds. 17 lbs.
Trip #1 Bridge Burn #1	20 21	42W	2W	120-200	1 .088	-	"	24 yds. 17 lbs.
Plot #1 Bridge Burn #1	21	42W	2W	120-200	.100	-	"	40 yds. 170 lbs.
Meadow Creek Burn #2	11	42W	2W	30	.005	-	"	32,320 yds. 1,080 lbs.
Knot Tree Patlatch Burn #1	6	40W	1W	120-170	.047	-	"	1,021 yds. 320.1 lbs.
" " " #2 Strip #2	6	40W	1S	120-180	.0215	-	"	4,000 yds. 1.01 lbs.
Average per acre					2.4943			854.1 yds. 321.2 lbs. 1.2 lbs.

TABLE NO. 10

Fire Disturbance in Pierce Region

Pierce Studies

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Pierce Burn #1 Plot # 1	36	37N	5E		.010	-	Fire	225 lac.
Pierce Burn #2 Adjoining plot	"	"	"	50	.0223	-	"	5,336 vis.
Pierce Burn #2 Entire Plot	"	"	"	50	.083	-	"	3,602 vis.
Pierce Burn #4	"	"	"	30-100	.008	-	"	1,000 vis.
C.T.C. Camp #2 Burn1	21	"	"	100-160	.0010	-	"	640 lacus.
" " " " " " #2	"	"	"	100-160	.0010	-	"	1,000 iner
Average per Acre					.1253			3,328 vis 21.1 lac. 8 inerm.

TABLE NO. 11

Fire Disturbance in Honeysuckle Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
Honeysuckle Repr. in Block 1 Camp1	4-5	51N	1W	120-160	23.5	36 lac. 14 vis	Fire	210 lac. 350 vis.
O.R. " " " Cutover	8-9	"	"	120-160	17.5	36 lac. 4 vis	Some Burning Logging	339 lac. 16 vis. 22 iner.
Area 1 Cutover Block 1 Camp 1	5 32	50N	"	120-160	132.0	13 lac	partly Burned Logged 1926	18 lac.
O.R. " " "	33	50N	"	120-160	21.0	13 lac	Burned & Logged	89 lac. 30 vis.

TABLE No. 10

Fire Disturbance in Pierce Prairie

Pierce Studies

Location				Original Timber Age Class	Average Area Stocked	Fires per A. Before Disturbance	Type of Disturbance	Fires per Acre Following Disturbance
Locality	S	T	R					
Pierce Burn #1 Plot #1	36	17N	2E		.010	-	Fire	.025 Inc.
Pierce Burn #2 Jack-pine Plot	"	"	"	80	.0822	-	"	1.758 Vic.
Pierce Burn #3 Slash Plot	"	"	"	40	.083	-	"	1.800 Vic.
Pierce Burn #4	"	"	"	80-100	.008	-	"	1.000 Vic.
O.T.C. Camp #2 Burned	25	"	"	100-160	.0010	-	"	540 Inacc.
" " " " #2	"	"	"	100-160	.0010	-	"	1,000 Vic.
Average per Acre					.1252			2,200 Vic. 21.1 Inc. 3 Inacc.

TABLE No. 11

Fire Disturbance in Honeysuckle Region

Location				Original Timber Age Class	Average Area Stocked	Fires per A. Before Disturbance	Type of Disturbance	Fires per Acre Following Disturbance
Locality	S	T	R					
Honeysuckle Meyr. in Block 1 Camp	4-5	31N	1W	120-160	28.8	24 Inc. 14 Vic.	26 Inc. Fire	2.9 Inc. 897 Vic.
O.T.C. " " " Cutover	8-9	"	"	120-160	17.5	46 Inc. 4 Vic.	Burning Logging	1.8 Inc. 15 Vic. 11 Inacc.
Area 1 Cutover Block 1 Camp 1	8 32	30N	"	120-160	132.0	12 Inc	Burned (part) Logged 1924	1.1 Inc.
O.R. " " "	32	30N	"	120-160	21.0	12 Inc	Burned Logged	80 Inc. 83 Vic.

TABLE NO. 11 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
D.R. Area#1 Block 1 Camp 1	32-29	51N	1W	160-200	124.0	19 lac.	Fire	25 lac.
O.R. " " "	28	"	"	160-200	4.0	10 lac	"	27 lac.
D.R. " Area 6 "	31	"	almost 1W	D.P. 160-200	25.0	18 lac	" (?)	18 lac. 11 vis.
D.R. " Block 1 Camp #5	5-6-8-	"	almost 1W	D.P. 120-160	138.0	5.9 lac .2 vis	"	38.7 lac. 2.2 vis
O.R. " Area#1 " #2	21-22-28	"	"	D.P. 60-80	426.7	3.0 lac	"	211.0 lac 2.5 vis
D.R. " " "	16 15 21 22	"	"	60-80	39.3	3.0 lac	"	110.0 lac .005 vis
O.R. Block 2 Camp 2 Area 2	21	"	"	D.M. 160-200	13.5	41 lac .05 vis .03 inerm	Burn & Cutover	897 lac. 3.6 vis.
Cutover Blk.1 " 3	33 4-5	50N	"	O.M. 160-200	235.0	32 lac	Piled & Burned Cutover	229 lac. .9 vis.
O.R. " " "	4-5	"	"	O.M. 160-200	8.0	32 lac	Cutover & Burned	203 lac. 1.2 vis.
D.R. " " "	5	"	"	O.M. 160-200	7.0	" " less here	Burn	46.0 lac.
Cutover " #2 "	33 3-4-10	51N 50N	"	D.M. 160-200	660.0	22 lac 6 vis	Pile Burn Cutover	319 lac. 98 vis.
O.R. " " "	10	50N	"	O.M. 160-200	16.0	21 lac 10 vis	Burn	74 lac. 58 visc.
Cutover " #3 "	27 28 33 34	51N	"	O.M. 160-200	160.0	49 lac 40 vis	mostly Pile Burned& Cutover	186 lac. 68 vis. 7 inerm.

TABLE NO. 11 (Continued)

Location				Ori-ginal Timber	Acreage of Tim-bered Area	Area in Acres Mature Timber	Type of Tim-ber	Miles per acre Pollow-ing Dis-turbance
Locality	E	T	R	Class				
D.S. Area #1 Block 1 Camp 1	25-29	5/8	1W	160-220	170.0	70 Acs.	Pine	50 Acs.
D.S. " " "	25	"	"	160-200	4.0	10 Acs	"	27 Acs.
D.S. Area 4 " "	21	"	1W	Almost B.T. 160-200	25.2	11 Acs	" (1)	13 Acs. 11 Yds.
U.S. " Camp #5 Block 1	5-6-8-	"	1W	Almost B.T. 150-180	170.0	3.8 Ales .8 Yds	"	38.7 Acs 8.8 Yds
U.S. Area 1 " " #5	4-22	"	"	B.T. 80-90	486.7	3.61 Ac	"	11.0 Ac 3.8 Yds
U.S. " " " "	18 15 21 22	"	"	80-80	18.8	3.91 Ac	"	110.0 Acs .008 Yds
U.S. Block 2 Camp 2 Area 2	21	"	"	D.M. 160-200	12.8	41 Acs .05 Yds/Ac	Burned & Cutover	.07 Acs. 3.8 Yds.
Cutover Tr.1 " 2	4-6	Slt	"	D.M. 160-200	170.0	22 Acs	Piled & Burned Cutover	229 Acs. .8 Yds.
U.S. " " "	4-6	"	"	D.M. 160-200	8.0	22 Acs	Cutover Burned	203 Acs. 1.2 Yds.
U.S. " " "	5	"	"	D.M. 160-200	7.8	Acs	Burn	48.0 Acs
Cutover " #2 "	4-10	Slt Clay	"	D.M. 160-200	260.0	Acs 1 Yds	Pile Burn Cutover	178 Acs. 24 Yds.
U.S. " " "	10	Slt	"	D.M. 160-200	15.0	21 Acs 1/2 Yds	Burn	74 Acs. 81 Yds.
Cutover " #2 "	2 28 25 24	Clay	"	D.M. 160-200	120.0	49 Acs 42 Yds	Pile Burn Cutover	342 Acs. 83 Yds.

TABLE NO. 11 (Continued)

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per Acre Following Disturbance
Locality	S	T	R					
				D.P.		14 lac.		11.2 lac.
O.R. Block 3 Camp 3	33	51N	1W	40-60	12.0	23 vis.	Burn	1.5 vis.
	34	51N		O.M.		47 lac.	Broad-	64.3 lac.
Cutover " #4 "	3-2	50N	"	160-200	248.0	37 vis	cast Burn Cutover	338.3vis.
				D.P.		32 lac.	.5 Ac	93.3 lac.
O.R. " "	34	51N	"	40-60	17.0	47.6vis	Double Burn	196.9 vis
Average per Acre					2,327.5			121.9 vis. 191.7 lac. .2 iner.

Intensity of burn undoubtedly plays a leading part in the resultant stand of Ribes following a fire. (See Photo No. #204.) The results in the controlled plot study of Ribes are further substantiation of the facts brought out in the following table:

TABLE No. 11 (Continued)

Location				Original Number of Trees Age Class	Average of Trees Burned Area Included	Trees per A. Before Fire Burned Density	Type of Fire Following Burn Damage	Trees per Acre Killed Fire Type
Locality	S	T	R					
U.S. Block 2 Camp 3	29	NW	12	D.F. 40-60	12.0	14 Inc. 83 Vig.	Burn	11.2 Inc. 1.8 Vig.
Outover " 44 "	24 S.	NW SW	"	D.F. 120-200	146.0	47 Inc. 37 Vig	Prod. cent Burn Outover	84.3 Inc. 338.3 Vig.
U.S. " Camp "	24	SW	"	D.F. 40-80	17.0	62 Inc. 47.8 Vig	Double Burn	62.4 Inc. 198.8 Vig
Average per Acre					2,317.6			123.9 Vig. 123.7 Inc. .2 Inger.

Intensity of burn undoubtedly plays a leading part in the resultant stand of pines following a fire. (See Photo No. 8804.) The results in the enumerated plot study of Pines are further substantiation of the facts brought out in the following table:

TABLE NO. 12

Intensity of Burn

Area	Unburned Parts of Pile Burn Plots		Light Burn		Hot Burn	
	No. Ribes per A.	Acre Basis	Number Ribes per Acre	Acre Basis	No. Ribes per A.	Acre Basis
Lakeview Cutover Area #1 Burn #1	-	.00244	9,589 R.vis	.00073	-	.00083
" " Burn #2	-	.00172	11,418 R.viscosiss.	.00141	2,298 R.vis.	.00087
" " Burn #3	-	.00267	13,846 R.vis	.00065	-	.00068
" " Burn #4	268	.00372	9,655 R.vis	.00145	1,205 R.vis.	.00083
" " Burn #5	-	.00254	10,000 R.vis	.00150	-	.00196
" " Burn #6	619	.00323	14,193 R.vis	.00310	1,138 R.vis.	.00167
" " Burn #7	-	.00062	16,666 R.vis	.00012	-	.0026
" " Burn #8	-	.0013	23,333 R.vis	.0012	666 R.vis.	.0015
" " Burn #9	-	.00184	57,144 R.vis	.00056	625 R.vis.	.0016
" " Burn #9A	-	.0002	30,000 R.vis	.00005	-	-
" " Burn #10	-	.00159	10,526 R.vis	.00095	-	.00146
" " Burn #11	-	.00204	12,142 R.vis	.00098	-	.00098
Lakeview Cutover Area #3 Burn #1	-	.00175	8,000 R.vis	.001	-	.00125
Controlled Plot Studies Plots #5			8,417 R.vis 291 R.lac	.024		
" " Plots #6					333 R.vis.	.012
Average of all areas	116.9 R.vis.	.02566	10,434 R.vis 186 R.lac	.03770	602 R.vis.	.01623

TABLE NO. 12

Intensity of Burn

Area	Unburned Turtle or Tile Burn Plots: No. Mites per A.	Unburned Turtle or Tile Burn Plots: Acre Basis	Light Burn: Number Mites per Acre	Light Burn: Acre Basis	Hot Burn: No. Mites per A.	Hot Burn: Acre Basis
Lakeview Cutover						
Area #1 Burn #1	-	.0004+	3,656 P.vis	.00675	-	.0005
" " Burn #2	-	.0017	11,412 P.vis.	.0141	2,398 P.vis.	.0005
" " Burn #3	-	.0856	12,346 P.vis	.0006	-	.0006
" " Burn #4	268	.0027	3,858 P.vis	.0014	1,206 P.vis.	.0005
" " Burn #5	-	.0254	10,000 P.vis	.0016	-	.0016
" " Burn #6	615	.0028	14,192 P.vis	.0190	1,128 P.vis.	.0019
" " Burn #7	-	.0003	14,866 P.vis	.0001	-	.0001
" " Burn #8	-	.0012	25,375 P.vis	.0118	664 P.vis.	.0078
" " Burn #9	-	.0018	57,144 P.vis	.0009	696 P.vis.	.0016
" " Burn #10	-	.0002	80,000 P.vis	.0006	-	-
" " Burn #11	-	.0018	10,858 P.vis	.0006	-	.0001
" " Burn #12	-	.0034	12,142 P.vis	.0704	-	.0001
Lakeview Cutover						
Area #3 Burn #1	-	.0017	4,000 P.vis	.701	-	.0018
Controlled Plot						
Stanley Plot #5			3,417 P.vis			
" " Plot #5			511 P.Inc	.084		
					635 P.vis.	.701
Average of all areas	Living	.0018	10,414 P.vis		696 P.vis.	.0018
			141 P.Inc	.0177		

BRUSH PILE BURNS

LAKEVIEW CUTOVER AREA

The effects of burning of brush piles upon the Ribes stand is very forcibly brought out by the records of Lakeview Cutover Area #1. (See Photos No. W705 and No. W204.)



W 705. This shows a small cutting area on which the brush has been piled [illegible]

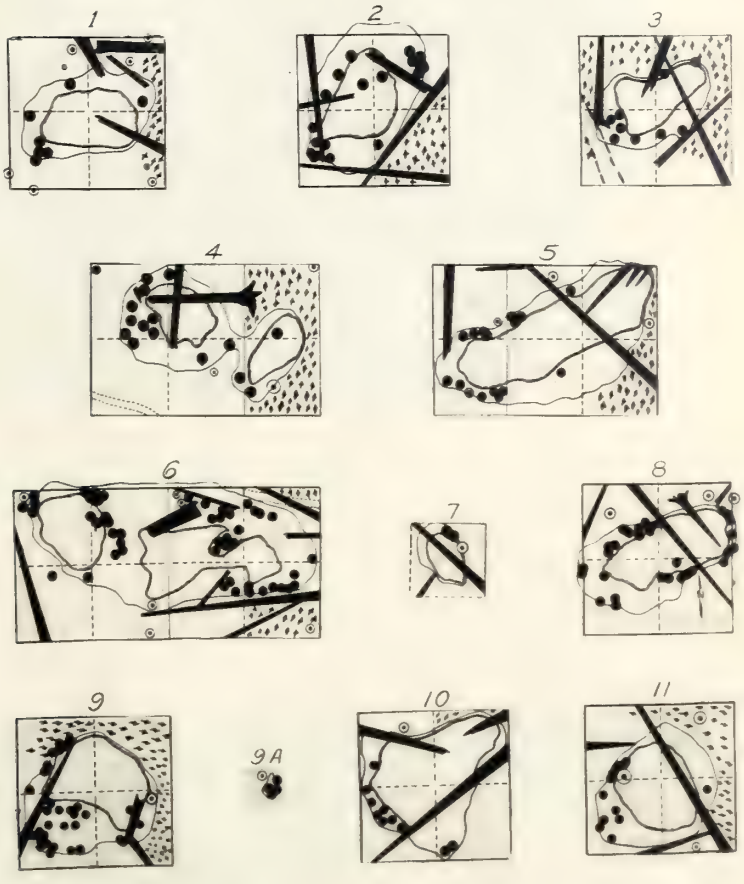
The effects of burning of brush piles upon the litter stand is very forcibly brought out by the records of Lakeview Cutover Area #1. (See Photos No. 4702 and No. 4694.)

BRUSHPILE BURNS
OF
LAKEVIEW CUTOVER AREA



W 705. This shows a small cutting area on which the brush has been piled and burned. The round black dots are ... Ribes

BRUSHPILE BURNS
LAKEVIEW CUTOVER AREA



W 204. This shows the individual brush pile burns of the preceding photo on a larger scale. It shows the hot center of the burn, the lighter fire more or less surrounding it, and the unburned area on the outside.

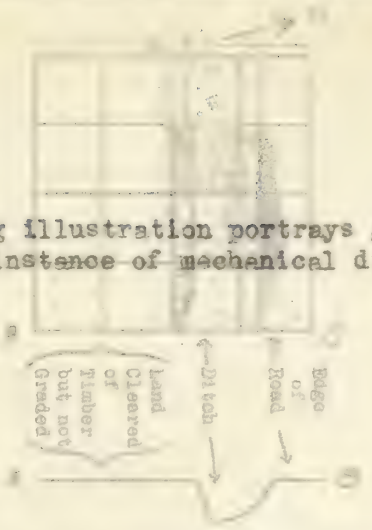


W10. Upper Priest River Sidehill. This area was photographed in 1925. Although not certain, it is probable that large R. lacustre bushes were pulled from this spot in the 1924 eradication and the new germination appeared on the disturbed ground.



W2s2. Head of Bismarck Creek, Kaniksu. Large R. lacustre bushes pulled from this spot in 1926. 178 R. lacustre seedlings counted at time of taking picture. Most of these seedlings are so small that they do not stand out in the picture.

The following illustration portrays graphically the actual results in one instance of mechanical disturbance:



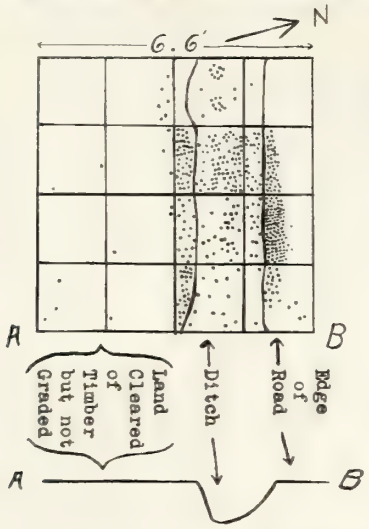
Profile cross-section of accompanying map, showing relation of Ribes to various slopes of the ditch adjoining the road.

Feb. 4-1928.
L. a Rockie



The following illustration portrays graphically the actual results in one instance of mechanical disturbance:

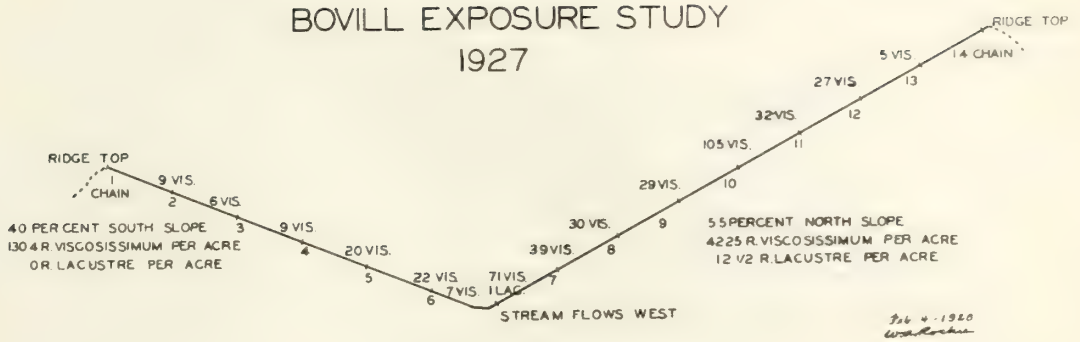
NEW RIBES VISCOSISSIMUM SEEDLINGS
ALONG THE EDGES OF A NEWLY GRADED DITCH



Profile cross-section of accompanying map, showing relation of Ribes to various slopes of the ditch adjoining the road.

Feb. 4-1928.
W.A. Rockie

BOVILL EXPOSURE STUDY
1927



Feb 4-1928
W.A. Rockie



W593. An island of "light burn" within a heavily burned area. Stored seed not destroyed in "light burn".

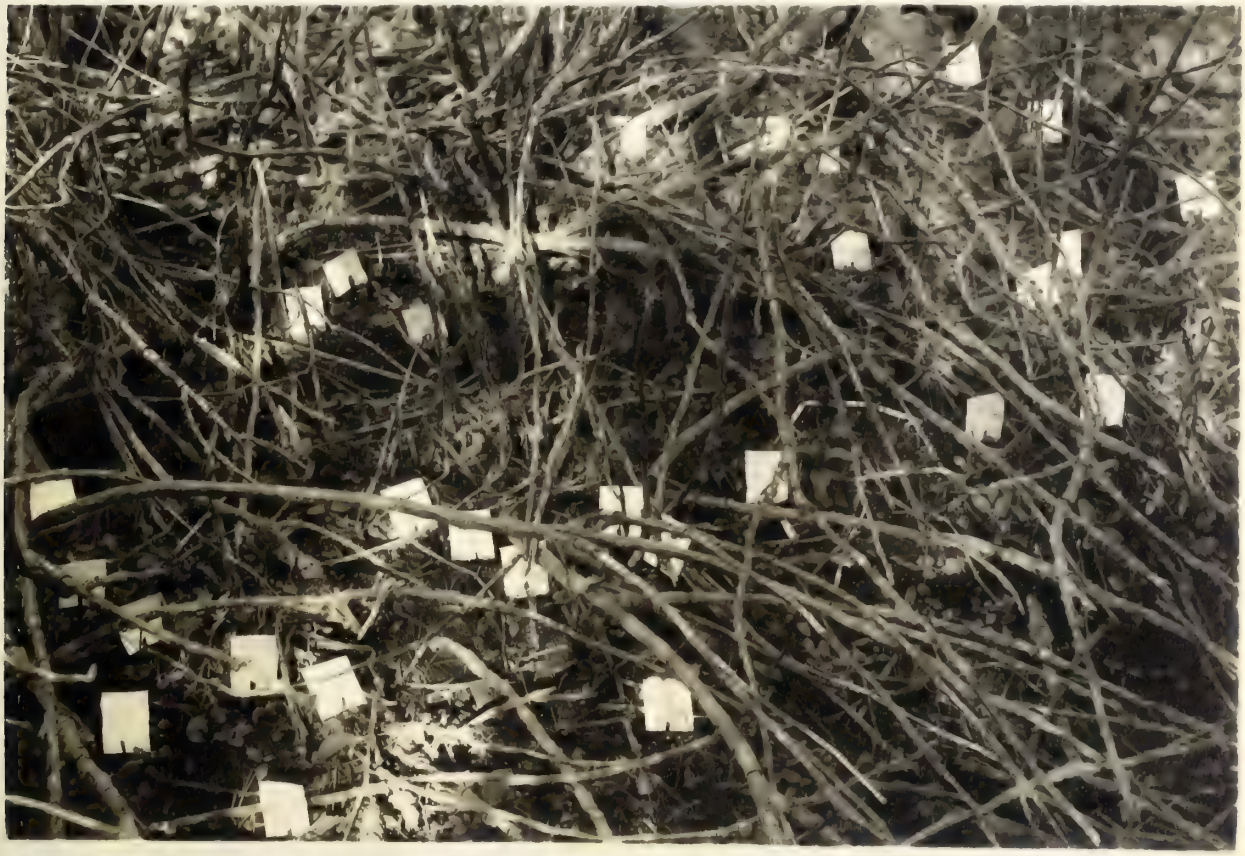


W570. An upturn. The "jolt" when the tree fell loosened and caused to fall much of the surface duff, bringing the seedbearing basal duff closer to the surface. Ribes resulted. No new Ribes could be found on the adjoining undisturbed ground.

Oviat Burn # 2



W596. String marks edges of "fire trench". The unburned area is to the left, burned to the right. Each Ribes along the trench is staked with a paper ticket.



W695. Shows R.petiolare seedlings under a bush killed by spraying, Aug. 1926 Clarkia, Idaho.



W276. Shows remnants of stands burned by fire 30 yrs. ago, also 30-yr. stand which followed fire.



W276. Mapping vegetation as found on plots.



W278. Showing method of trenching around plot to cut off all roots from outside.



W275. Method of mapping vegetation as found on plots.

The mechanical disturbance of the duff emphasizes the effects of logging operations, road and trail building and similar disturbances upon the Ribes stand of any region. The tabulated results are as follows:

TABLE NO. 13

Mechanical Disturbance in Kaniksu Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Planted Plot G Upper Priest River	Unsurveyed			30+	.00025	-	Duff Removed	36,000 lac.
Planted Plot H " " "		"		30+	.00025	-	Duff Removed	-
Planted Plot M " " "		"		25-30	.00025	-	Needles piled on bare soil	-
Planted Plot N " " "		"		25-30	.00025	-	Duff piled on bare soil	-
Planted Plot P " " "		"		30+	.00025	-	Duff Removed	44,000 lac.
Planted Plot S " " "		"		30+	.00025	-	"	4,000 vig.
Planted Plot T " " "		"		30+	.00025	-	Duff piled on al - luvium	-
Planted Plot U " " "		"		30+	.00025	-	"	-
Planted Plot V " " "		"		30+	.00025	-	"	-
1926 Eradication Camp # 1	30	60W	5W	50-80	.06	300 W.lac.	Clearing for camp use	1,800 lac.
1926 Binarch Creek Eradication Plots	30	"	"	Very mixed 0-200	.005	-	Eradication of lac.	6,800 lac.
1926 Lamb Creek Eradication Plots	19	"	"	100-120 30-40	.01	-	Erad. of iner	48,000 iner
Average per acre								18,571 s. 5,851 c 7,141 lp.

The mechanical disturbance of the duff employed in the effects of logging operations, road and trail building and similar disturbances upon the Hibbs stand of any region. The tabulated results are as follows:

TABLE NO. 12

Mechanical Disturbance in Logging Units

Location				Original Timber Stand	Area Disturbed	Percentage of Disturbance	Miles per A. Surface Distur- bance	Type of Dis- turbance
Locality	S	T	E					
Planted Plot C Upper Trinet River				300+	.0025%	-		Duff removed
Planted Plot K " " "			"	170+	.0025%	-		Duff removed
Planted Plot E " " "			"	17-20	.0025%	-		Trail filled on Duff
Planted Plot I " " "			"	14-40	.0025%	-		Duff filled on Surface
Planted Plot P " " "			"	180+	.0025%	-		Duff removed
Planted Plot R " " "			"	200+	.0025%	-	"	"
Planted Plot P " " "			"	200+	.0025%	-		Duff filled on el - ivation
Planted Plot U " " "			"	200+	.0025%	-	"	"
Planted Plot V " " "			"	200+	.0025%	-	"	"
1926 Predilection Camp & I	20	20W	"	23-20	.06	200 B.ft.	Clearing for Camp Ad	6,800 lin.
1926 Stevens Creek Predilection Plots	20	"	"	Duff mixed 0-200	.004	-	Trail- cation Ad jac.	8,800 lin.
1926 Lamb Creek Predilection Plots	18	"	"	100-130 20-40	.3	-	Trail cut here	4,400 lin.
Average for area								7,400 lin.

TABLE NO. 14

Mechanical Disturbance in Lakeview Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Seedling Survival	9	53N	1W	40	.001	-	Road Bldg.	455,000 vis.
Skid trail Lakeview Cutover Area # 1	9	53N	1W	40	0.05	-	Skid trail	1,80 vis. 60 lac.
Average per acre					.0555			13,621 vis. 54 lac.

TABLE NO. 14

Mechanical disturbance in Lacrylue Region

Locality	S	T	R	Original Number of Distinct Areas Disturbed	Average Area per Disturbance	Type of Disturbance	Fiber Length
Seattle Surveyed	5	52E	1E	40	.003	-	4ft.,000 yrs.
Sold Trail Lakeview Survey Area 4 I	5	52E	1E	40	0.05	-	1240 Natural 60 Inc.
Average per acre					.0004		24,041 yrs. Ca Inc.

TABLE NO. 15

Mechanical Studies in Harvard Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per Acre Before Disturbance	Type of Disturbance	Ribes per A. following Disturbance
Locality	S	T	R					
Bloom Meadow to Badger Meadow Potlatch Road	25-30	41N	1-2E	81-100	1.00	12	Road Bldg.	465 petiol. 370 inermis 15 lacustre
Gold Hill Germination Study # 1	20	42N	3W	40	.006	-	Controlled removal of surface duff	30,167 visc.
" " " "	"	"	"	40	.006	-	Controlled entire duff removal	4,667 visc.
Meadow Creek Germination Study # 1	14	"	"	160-200	.004	-	Cont. removal surf. duff	500 visc. 750 lac.
Gold Hill Germination Study # 2	20	"	"	160-200	.001	Ribes brot in by mining Co. 20 yrs. past timber stand has no R.	Complete " Removal cont.	-
" " " " "	"	"	"	160-200	.001		Controlled partial duff removal.	-
Restocking Study of Chemical Eradication - Clarkia	4-5	42N	2E	60-80	.006	Solid with mat. bushes	Chemical Eradication	99,333 pet.
Meadow Creek Strip 9 A 1	14	42N	3W	100-160	.0045	-	Skid trail	10,000 lac.
Hog Meadow # 1 Strip # 1	3	40N	1E	100-160	.005	-	" "	8,200 vis.
Stark Cutover Area	20	42N	3W		.043	-	Logging	2,837 vis.
East Fork Potlatch Burn # 1	6	40N	1E	120-160	.002	-	Skid trail	1,714 vis.
Average per Acre					1.1245			407.8 vis. 65. lac. 3[illegible].8 iner. 9[illegible].4 pet.

TABLE NO. 15

Mechanical Studies in Burned Region

Location				Original Timber Age Class	Average of Disturbed Area Studied	Mixes per Acre before Disturbance	Type of Disturbance	Mixes per Acre following Disturbance
Locality	S	T.	R					
Stone Meadow to Badger Meadow Portal-Loch Road	29-30	41N	1-2E	81-100	1.00	Nos 2&4.	None Dist'd.	45% ventil. 27% interim 1% Loamins
Gold Hill Germination Study # 1	30	41N	2E	40	.000	-	Control'd removal of surface duff	20.1% vine.
" " " "	"	"	"	40	.000	-	Controlled entire duff removed	4.0% vine.
Meadow Creek Germination Study # 1	14	"	"	140-200	.000	-	Cont. removal duff	500 vine. 2% Inc.
Gold Hill Germination Study # 2	24	"	"	160-200	.000	-	Like No. 1 in Y micro-climate	Complete removal cont.
" " " "	"	"	"	160-200	.001	-	Controlled partial duff removal.	-
Reconnoitering Study of Chemical Eradication - Clarkia	5-9	40N	2E	80-90	.000	Solid with cut, burned	Chemical application	24,000 est.
Meadow Creek Strip 2 A 1	14	40N	1W	120-160	.000	-	Strip trail	15,000 Inc.
Log Meadow # 1 Strip # 1	3	40N	1W	120-160	.000	-	" "	6,200 vis.
Stark Cabover Area	20	42N	2W		.000	-	Logging	2.85% vis.
Mast Fork Potlatch Burn # 1	6	40N	1E	120-160	.000	-	Strip trail	1.7% vis.
Average per Acre					1.1245			40%.6 vis. 8%: 1 Inc. 8%: 2 Inc. 8%: 3 Inc.

TABLE NO. 15

Mechanical Disturbance in Pierce Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following disturbance
Locality	S	T	R					
C. T. C. Camp # 2 Burn # 1	21	37N	5E	100-160	.0006	-	Duff disturbed by logging	1,280 inerm.
Average per acre					.0006			1,280 inerm.

TABLE NO. 17

Mechanical Disturbance in Honeysuckle Region

Location				Original Timber Age Class	Acreage of Disturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
O.R. Cutover Block # 3 Camp # 4	9-16	51N	1W	120-160	90.75	44 lac 11 vis .2 iner	No burning; logging	206 lac
" " # 4 " # 4	8-9 16 17	51N	1W	120-160	177.2	94 lac 42 vis	"	235 lac 16 vis
O.R. Block # 3 Camp # 5	18	51N	1W	O.M. 120-160	38.0	6.8 lac .7 vis	Not Burned Cutover	19.1 lac 7.7 vis
Cutover Block # 1 Camp # 5	6	51N	1W	120-160	10.0	5.8 lac .2 vis	Cutover	75.8 lac 75.5 vis
" Block #3 Camp # 5	7-18	51N	1W	D.M. 120-160	308.0	25.01 lac .2 vis	"	360.81 lac .7 vis
" Block #2 " # 5	8	51N	1W	O.M. 120-160	100.0	58.01 lac	"	164.01 lac .1 vis 14.5 iner
Area 2 " Block 2 Camp 2	16 21	51N	1W	O.M. 160-200	225.0	136 lac .6 vis .1 iner	15 yrs. Cutover	241 lac 1.2 vis 2.5 iner
Average per acre					948.95			4.6 vis 277.4 lac 2.1 iner

TABLE NO. 15

Mechanical Disturbance in Pierre Region

Location				Original Timber Age Class	Average of Disturbed Area	Time per A. before Disturbed	Type of Disturbance
Locality	S	T	R				
S. T. C. Camp # 5 Burn # 1	21	27N	5E	100-180	.0006	-	Surfaced by logging
Average per acre					.0006		

TABLE NO. 17

Mechanical Disturbance in Honeysuckle Region

Location				Original Timber Age Class	Average of Disturbed Area	Time per A. before Disturbed	Type of Disturbance
Locality	S	T	R				
S.E. Quarter Block # 3 Camp # 4	8-16	21N	1W	120-180	80.75	44 lac 11 via	No disturbance
" " # 4 "	8-9-16-17	21N	1W	120-180	177.2	34 lac 16 via	"
S.W. Block # 8 Camp # 5	18	21N	1W	S.E. 120-180	24.0	6.8lac .7via	Not Burned
Quarter Block # 1 Camp # 5	6	21N	1W	120-180	10.0	5.5lac .3via	Quarter
" Block #3 Camp # 5	7-18	21N	1W	S.E. 120-180	224.0	25.7lac .2via	"
" Block #2 " # 5	5	21N	1W	S.W. 180-180	100.0	76.0lac .3 via	"
Area 2 " Block 2 Camp 2	19 21	21N	1W	S.E. 180-300	320.0	1856lac .6 via .1 lac	15 pre. Quarter
Average per acre					948.MC		

Very few areas having the duff undisturbed, with the timber canopy removed, were found. This phase of the study will be more thoroughly covered during the coming season. All areas examined, which bear any relation to this phase of the problem, are included in the following tabulation:

TABLE NO. 18

Undisturbed Study Areas in Kaniksu Region

Location				Original Timber Age Class	Acreage of Undisturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Larson Hill Burn	22	59N	5W	20-40	Reconn.	-	-	-
Strip # 1 Quartz Cr. Burn		58N	4-5W	200+	.010	-	-	-
Strip # 2 " " "		"	"	200+ 10-20	.007	-	-	-
Strip # 3 " " "		"	"	200+ 40-80	.010	-	-	-
Planted Plot I Upper Priest R.	Unsurveyed			200+	.00025	-	Duff not disturbed	-
Planted Plot J " " "		"		200+	.00025	-	"	-
Planted Plot K " " "		"		25-30	.00025	-	Bare Soil	-
Planted Plot L " " "		"		25-30	.00025	-	Bare mineral Soil	-
Planted Plot O " " "		"		200+	.00025	-	Duff not disturbed	-
Planted Plot Q " " "		"		200+	.00025	-	"	-
Planted Plot S " " "		"		200+	.004	-	"	-
Average per Acre					.0325			-

Very few areas having the duff undisturbed, with the timber canopy removed, were found. This phase of the study will be more thoroughly covered during the coming season. All areas examined, which bear any relation to this phase of the problem, are included in the following tabulation:

TABLE NO. 18

Undisturbed Study Areas in Douglas Region

Locality				Original Timber Cut- Diam.	Acreage of Undisturbed Area Studied	Miles per A. More Dis- tance	Type of Dis- tur- bance	Time ery A. Follow- ing Dis- turbance
Larson Hill Farm	22	SW	E	20-40	Preceding.	-	-	-
Turip # 1 Castle Cr. Farm			E-	200+	.010	-	-	-
" # 2 " " "			"	200+ 10-20	.007	-	-	-
" # 3 " " "			"	200+ 20+ 40-60	.010	-	-	-
Planted Plot 1 Cedar Pines R.			Undisturbed	200+	.00025	-	Duff and litter undisturbed	-
Planted Plot 2 " " "			"	200+	.00025	-	"	-
Planted Plot 3 " " "			"	30-40	.00025	-	Bare Soil	-
Planted Plot 5 " " "			"	20-30	.00025	-	Bare mineral soil	-
Planted Plot 6 " " "			"	200+	.00025	-	Duff not dis- turbed	-
Planted Plot 4 " " "			"	200+	.00025	-	"	-
Planted Plot 5 " " "			"	200+	.00025	-	"	-
Average per Acre					.00025			-

TABLE NO. 19

Undisturbed Study Areas in Lakeview Region

Location				Original Timber Age Class	Acreage of Undisturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Strip#5 Lakeview Burn # 1	9	53N	1W	40	.004	-	-	-
Strip#6	"	"	"	"	.002	-	-	-
Strip#7	"	"	"	"	.0015	-	-	-
Strip#8 Lakeview Burn # 2	8	53N	1W	"	.002	-	-	-
Strip#1 Cedar Creek Fire	35	54N	1W	Mixed	.003	-	-	-
Lakeview Cutover Area # 1	9	53N	1W	40	0.6	-	Some cutting but duff not disturbed	-
Lakeview 1926 Cutover Area # 1	"	"	"	40	.1	-	Untouched slashing	-
Xeno Creek Area	9-10	63N	3E	120-160	8.0	-	Insect-Killed	-
Deer " "	29-32	64N	3E	200+	2.0	-	"	-
Average per acre					10.7125	-		-

Location				Original Number of Trees	Acreage Treated per A. Tractor	Miles per A. Tractor	Type of Tractor	Miles per Gallon Tractor
Locality	S	T	R					
Extinct Lakeview Tree # 1	5	32N	1E	40	.004	-	-	-
" " " # 2	"	"	"	"	.006	-	-	-
" " " # 3	"	"	"	"	.0015	-	-	-
Extinct Lakeview Tree # 2	8	32N	1E	"	.006	-	-	-
Cedar Creek Fire	22	34N	1E	Scrub	.007	-	-	-
Lakeview Cutover Area # 1	3	32N	1E	40	0.8	-	One mulling belt half was driven	-
Lakeview Late Cutover Area # 1	"	"	"	40	.1	-	Insufficient time	-
Long Green Area	10	32N	2E	120-150	1.0	-	Insecticide	-
Dust "	10	32N	2E	200+	2.0	-	"	-
Average per Acre					110.7128	-		-

TABLE NO. 20

Undisturbed Study Areas in Harvard Region

Location				Original Timber Age Class	Acreage of Undisturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Gold Hill Germination Study # 1	20	42N	3W	40	.006	-	Controlled Check	2.167 viscos.
Meadow Creek Germination Study # 1	14	"	"	160-200	.004	-	Cont. Check	-
Gold Hill Germination Study # 2	20	"	"	"	.001	-	Controlled undisturbed Duff.	-
Strip D Meadow Creek # 1	14	"	"	100-160	.01525	-	-	-
Strip E " "	"	"	"	"	.016375	-	-	-
Strip # 1 " "	"	"	"	"	.071	17 lac	-	17 lac.
Strip 9 E1 " "	"	"	"	"	.0095	-	-	-
Strip 9 A1 " "	"	"	"	"	.025	-	-	-
Strip # 1 Hog Meadow # 1	3	40N	1W	"	.028	-	-	-
1927 Strip # 1 Meadow Creek # 1	14	42N	3W	"	.002	-	-	-
1927 Strip # 2 Meadow Creek # 1	"	"	"	"	.001	-	-	-
1927 Strip # 3 " "	"	"	"	"	.002	-	-	-
1927 Strip # 4 " "	"	"	"	"	.0015	-	-	-
Boone Cutting Area # 1	7	42N	2W	120+	.006	-	-	-
Strip # 1 " " " # 2	"	"	"	100-200	.003	-	-	-
Oviat Burn # 1	1	39N	1E	120-160	1.0	-	-	-
" " # 2	6	"	2E	"	1.0	-	-	-
Emida Burn # 1	20 21	43N	2W	160-200	1.0	-	-	-
Strip # 1 East Fork Potlatch Burn # 2	6	40N	1E	120-160	1.0	-	-	-
Average per acre					4.290625			2.6 vis - lac

TABLE NO. 59

Undistributed Tract Areas in Various Location

Location				Principal Timber Species	Average Undisturbed Area	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Gold Hill Germination Study # 1	20	42W	1W	40	.07%	-	Control Jad Cone	.16%
Meadow Creek Germination study # 1	14	"	"	100-200	.05%	-	Cont. Cone	-
Gold Hill Germination Study # 2	20	"	"	"	.00%	-	Control undisturbed Ribes	-
Strip 1 Meadow Creek # 1	14	"	"	100-110	.01%	-	-	-
" "	"	"	"	"	.01+%	-	-	-
Strip # 1 " "	"	"	"	"	.02%	17 Ave.	-	17 Ave.
Strip 5 #1 " "	"	"	"	"	.00+%	-	-	-
Strip 5 #1 " "	"	"	"	"	.00%	-	-	-
Strip # 1 Log Meadow # 1	3	40W	1W	"	.00%	-	-	-
1927 Strip # 1 Meadow Creek # 1	14	42W	1W	"	.00%	-	-	-
1927 Strip # 2 Meadow Creek # 1	"	"	"	"	.00%	-	-	-
1927 Strip # 2 " "	"	"	"	"	.00%	-	-	-
1927 Strip # + " "	"	"	"	"	.01%	-	-	-
Cocoa Cutting Area # 1	7	42W	2W	120+	.00%	-	-	-
Strip # 1 " " " # 2	"	"	"	100-200	.00%	-	-	-
Pulet Burn # 1	1	32W	1E	120-140	1.0	"	"	"
" " # 2	2	"	2E	"	1.0	-	-	-
Delta Burn # 1	20 21	42W	2W	100-200	1.0	-	-	-
Strip # 1 East Fork Petlatch Burn # 2	6	40W	1W	120-160	1.0	-	-	-
Burned Over Area					1.0+%			1.0 Ribes - Jad

TABLE NO. 21

Undisturbed Study Areas in Pierce Region

Location				Original Timber Age Class	Acreage of Undisturbed Area Studied	Ribes per A. Before Disturbance	Type of Disturbance	Ribes per A. Following Disturbance
Locality	S	T	R					
Pierce Burn # 1 Plot #1	36	37N	5 E		1.0	-	-	-
" " # 2 Adjoining Plot	"	"	"	50	1.0	-	-	-
" " "	"	"	"	50	0.1	-	slashing only	-
Burn # 2 C. T. C. Camp # 2	21	"	"	100-160	.0006	-	-	-
Average per acre					2.1006			

TABLE NO. 21

Undisturbed Study Areas in Pierce Region

Locality	Location S	T	R	Original Timber Age Class	Acreage of Studied Area Studied	Miles per A. Before Timber- ing	Type of Pulp- ing Fin- ished
Pierce Burn # 1							
Plot #1	24	17N	8 W		1.0	-	-
" " # 2							
Adjoining Plot	"	"	"	70	1.0	-	-
" " "	"	"	"	80	0.1	-	simply
Burn # 2							
U. T. C. Camp # 2	21	"	"	100-180	.0005	-	-
Acreage per acre					2.1005		

Several burned areas have been examined in two consecutive years. These results give some indications of what may be expected as regards the survivial, establishment and growth of Ribes seedlings. The findings to date are given in the following table:

Several burned areas have been examined in two consecutive years. These results give some indications of what may be expected as regards the survival, establishment and growth of Ribes seedlings. The findings to date are given in the following tables:

TABLE NO. 22

Survival, Establishment and Growth of Ribes Following Fire

	Yr. of Dominant Germination	Light Conditions	Acreage Basis	Number Ribes per Acre				Ave. Ht. of Bush				Average Live Stem per Bush			
				R. viscosiss.		R. lacustre		R. visco.		R. lacustre		R. visco.		R. lacustre	
				1926	1927	1926	1927	1926	1927	1926	1927	1926	1927	1926	1927
Burned Portion, Strip D, Meadow Cr. Burn #1	1925	Almost complete shade from direct sunlight.	.00975	4,650	1,846	-	308	.5	.75	-	.2	.6	2.3	-	.2
Unburned Portion, Strip D, Mdw. Cr. Burn 1	"	Same	.00275	-	-	-	-	-	-	-	-	-	-	-	-
Burned Portion, Strip E, Mdw. Cr. Burn 1	1926	Full sunshine 2/3 of day.	.008825	10,141	8,451	2,592	1,690	.27	.51	.16	.36	.31	.96	.30	.54
Unburned Portion "	1926	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strip #1 Mdw. Cr. Burn 1	1925-26	" "	.225	1,031	857	333	457	.32		.30		.43		.32	
Strip 9B " " "	1925	" "	.1125	284	284	942	818	.47	.67	.39	.51	.67	1.83	1.51	2.52
Strip C " " "	1925	" "	.1375	895	632	480	698	.74	1.08	.44	.50	2.16	3.67	1.06	1.64
Strip #1 " " " 2	1926	Sunshine 2/3 day.		36,000		1,030		.05		.04		.05		.04	
Burned Area, Oviat Burn # 1	1927	Half sunshine 2 hrs. of day.		-	-	-	10.6	-	-	-	.1	-	-	-	.1
Fire Trench " "	1926	" "		30	30	-	40	.2	.7	-	1.0	.2	.85	-	1.0
Broadcast Burn, Hog Meadow Burn # 1	1926	60% broken sunshine.	.025	40	200	-	-	.15	.20	-	-	.15	.20	-	-
" " " " Skid Trails.	1926	30% Broken sunshine.	.005	9,600	8,400	-	-	.03	.28	-	-	.03	.31	-	-
East Fork Potlatch Burn # 2	1926	70% Broken sunshine.	.0075	2,000	1,733	133	133	.07	.35	.25	.30	.07	.37	.25	.40

TABLE NO. 72

Survival, Establishment and Growth of Pines Following Fire

	Yr. of Origination	Light Conditions	Average Basis	Number Pines per Acre				Ave. Ht. of Pine				Average Live Stem per Rod			
				R. vicc. 1926	R. vicc. 1927	R. Jacmate 1926	R. Jacmate 1927	R. vicc. 1926	R. vicc. 1927	R. Jacmate 1926	R. Jacmate 1927	R. vicc. 1926	R. vicc. 1927	R. Jacmate 1926	R. Jacmate 1927
Burned Portion, Strip D, Border Gr. Burn)	1925	Almost complete shade from direct sunlight.	.00479	4,650	1,846	-	302	.8	.75	-	.2	-	2.3	.6	.2
Unburned Portion, Strip D, NW. Gr. Burn)	"	Same	.00279	-	-	-	-	-	-	-	-	-	-	-	-
Burned Portion, Strip E, SW. Cr. Burn I	1926	Full sunshine 1/2 of day.	.00825	10,141	8,452	3,982	1,690	.47	.51	.19	.36	.31	.96	.20	.84
Unburned Portion "	1926	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burned Area, Cr. Burn)	1925	" "	.255	1,081	887	373	457	.36				.40		.32	
Strip 2 " " "	1925	" "	.1159	598	284	242	91	.47	.87	.39	.81	.27	1.80	.51	2.31
Strip 3 " " "	1926	" "	.1275	676	638	487	241	.74	1.08	.46	.50	1.49	1.67	1.08	1.68
Cutting " " "	1926	Shade Line 1/2day		26,000		1,088		.50		.84		.34		.04	
Burned Area, Oviat Burn 1	1927	Full sunshine 5 hrs. of day.		-	-	-	10.6	-	-	-	.1	-	-	-	.1
Fire Trench " "	1926	" "		80	80	-	40	.8	.7	-	1.0	.2	.36	-	1.0
Unburned Area, Log Shadow Burn 1	1926	50% Direct sunlight.	.366	40	200	-	-	.14	.25	-	-	.14	.20	-	-
" "	"	20% Direct sunlight.	.208	8,920	8,400	-	-	.84	.84	-	-	.04	.21	-	-
Burn Test Plots Burn 1 & 2	1923	2% direct sunlight.	.3275	2,200	1,744	132	132	.72	.58	.45	.30	.07	.27	.11	.43

VIII. Summary

Burning of forest areas removes part or all of the insulating duff mantle. When stored seed are present in the basal part of this duff, this seed either germinates (when duff is but partially burned) or it is destroyed (when duff is entirely consumed). Where no stored seed are present in the duff, or where the fire is sufficiently severe to entirely destroy the duff, a Ribes free timber stand follows the fire.

Mechanical disturbance of the duff, such as occurs generally in connection with our present day methods of logging, with road and trail construction, camp building, and similar activities, effectively starts the germination of stored Ribes seeds if they are present. The undisturbed areas of duff seldom show any Ribes.

Disturbing or removing the shade canopy without disturbing the duff does not result in a new Ribes generation, until there is also a disturbance of the duff.

Disturbing or removing the duff, even though the timber canopy is not disturbed, results in new Ribes germination.

Finally, it appears that, if timber crops of a given area were removed or destroyed without disturbing the duff mantle, there would be no Ribes problem there. All native Ribes species of the north Idaho white pine region, in their respective sites, appear to be similarly affected by the disturbance of the duff. This control now appears more exacting and absolute for Ribes viscosissimum than for the other species, but further data are necessary before definite conclusions can be made.

VIII. Summary.

Survival of Ribes seedlings is apparently subject to wide variations under different conditions.

Under heavy shade, the survival is relatively low.

In open situations it is (1) very high if on a moist site and (2) very low if on a droughty site.

The Bovill exposure study, on an area which originally apparently had identical conditions on both slopes, shows the Ribes stand on a moist north slope in contrast to the stand on a dry south slope. The north slope has more than three times as many Ribes per acre as the south slope. A further contrast is noted in that the lower half of the south slope has almost three times as many Ribes per acre as the upper half. The lower half of the north slope, on the other hand, has no more Ribes than has the upper half. These differences can logically be interpreted as largely due to survival.

The plot studies established by the Priest River Experiment Station in the Kaniksu region and by the University of Idaho in the Clearwater region were examined, but later examinations are necessary before any results can be stated.

Survival of Ribes seedlings is apparently subject to wide variations under different conditions. In open situations it is (1) very high if on a moist site and (2) very low if on a dry site. Under heavy shade, the survival is relatively low.

The Devil's exposure study, on an area which originally apparently had identical conditions on both slopes, shows the Ribes stand on a moist north slope in contrast to the stand on a dry south slope. The north slope has more than three times as many Ribes per acre as the south slope. A further contrast is noted in that the lower half of the south slope has almost three times as many Ribes per acre as the upper half. The lower half of the north slope, on the other hand, has no more Ribes than has the upper half. These differences can logically be interpreted as largely due to survival.

The plot studies established by the Priest River Experiment Station in the Kaniksu region and by the University of Idaho in the Clearwater region were examined, but later examinations are necessary before any results can be stated.

RESTOCKING OF RIBES AFTER ERADICATION

I. Definition of the Experiment

This experiment is very closely related to the studies of duff disturbance. It is a systematic study of forest areas within which Ribes eradication has disturbed the normal forest floor, to determine the entire effect of this disturbance.

II. Description of Basis Used in Selecting Experimental Units

Several areas which had been eradicated of Ribes were selected for this study. At least one potential area for each native Ribes species was included. Areas were established within hand eradicated and chemically eradicated blocks. It was intended that every type of condition, which had resulted from eradication be studied.

III. Methods of Study

The designated areas were carefully measured and permanently staked. They were then mapped to scale, showing the position and detailed description of each new Ribes found following eradication. The regular ecology form WF #36 was filled out for every Ribes bush. Typical areas of R. viscosissimum, R. lacustre and G. inermis were mapped before eradication to be checked during succeeding years.

IV. Plan for Recording Data

The following data were taken for each Ribes and for its associations: (See Form #36, Ribes Ecology, II. Methods of Study.)

I. Definition of the Experiment

This experiment is very closely related to the studies of dust disturbance. It is a systematic study of forest areas within which Ribes eradication has disturbed the normal forest floor, to determine the entire effect of this disturbance.

II. Description of Plots used in Planning Experimental Units

Several areas which had been eradicated of Ribes were selected for this study. At least one potential area for each native Ribes species was included. Areas were established within hand eradicated and chemically eradicated blocks. It was intended that every type of condition, which had resulted from eradication be studied.

III. Methods of Study

The designated areas were carefully measured and permanently staked. They were then mapped to scale, showing the position and detailed description of each new Ribes found following eradication. The regular ecology form U #36 was filled out for every Ribes bush. Typical areas of R. vicosissimum, R. lacustre and G. lasianthum were mapped before eradication to be checked during succeeding years.

IV. Plan for Recording Data

The following data were taken for each Ribes and for its associations: (See Form #36, Ribes Ecology, II. Methods of Study.)

V. Plot Index

TABLE NO. 23

List of Eradicated Areas Studied

Name of Plot	Location of Plot S	T	R	Area of Plot	Slope Dir.	%	Original Age Class	Date of Disturbance	Date Experiment Established
Gold Hill #1				.1	NE	30	100-200	Burned about 1890	Aug.30-1927
Honeysuckle #1	33	51N	1W	.080	SE	30	200	" 1907	1927
" 2	4	50N	"	.161	NE	10	200	Logged.	July 1-1927
" 3	"	"	"	.109	"	30	200	"	June29-1927
" 4	34	51N	"	.184	SW	30	200	Burned about 1900	Aug.12-1927
" 5	28	"	"	.449	-	0	200	Logged.	Aug. 1-1927
" 6	10	"	"	.1	E	5	200	None recent	July12-1927
" 7	4	"	"	.1	NE	15	160	Logged Mat.	Aug. 2-1927
" 8	8	"	"	.1	SE	?	160-200	Repro. in logged Mat.	July 2-1927
Binarch Creek #1A	30	60N	5W	.001	-	0	Dense Str. type	1926 Eradication	1927
" " #1B	"	"	"	.001	-	0	"	"	"
" " 2A	"	"	"	.001	-	0	"	"	"
" " 2B	"	"	"	"	-	0	"	"	"
" " 3A	"	"	"	"	-	0	"	"	"
" " 3B	"	"	"	"	-	0	"	"	"
" " 4A	"	"	"	"	-	0	"	"	"
" " 4B	"	"	"	"	-	0	"	"	"
" " 5A	"	"	"	"	-	0	"	"	"
" " 5B	"	"	"	"	-	0	"	"	"
Lamb Creek #1 A	21	"	"	"	-	0	"	"	"
" #1 B	"	"	"	"	-	0	"	"	"
" #2 A	"	"	"	"	-	0	"	"	"
" #2 B	"	"	"	"	-	0	"	"	"
" #3 A	"	"	"	"	-	0	"	"	"
" #3 B	"	"	"	"	-	0	"	"	"
" #4 A	"	"	"	"	-	0	"	"	"
" #4 B	"	"	"	"	-	0	"	"	"
" #5	"	"	"	"	-	0	"	"	"
" #6	"	"	"	"	-	0	"	"	"
Clarkia #1 A	4-5	42N	2E	"	-	0	"	"	"
" #2 A	"	"	"	"	-	0	"	"	"
" #3 A	"	"	"	"	-	0	"	"	"
" #1 B	"	"	"	"	-	0	"	"	"
" #2 B	"	"	"	"	-	0	"	"	"
" #3 B	"	"	"	"	-	0	"	"	"

V. Plot Index

PLATE No. 83

List of V-dilated Trees Studied

Name of Plot	Location of Plot S	T	R	Area of Plot	Slope Exp.	%	Original Age Class	Date of Disturbance	Date Experiment Established
Gold Hill #1				.1	Ne	20	100-200	Burned (Sept.) 1890	Aug.20-1927
Honeysuckle #1	23	21E	1W	.080	SE	30	200	" 1907	1927
" 2	4	20E	"	.151	"	10	200	Logged.	Fall 1-1927
" 3	"	"	"	.139	"	30	200	"	Summer-1927
" 4	14	21E	"	.184	SW	30	200	Burned about 1900	Aug.15-1927
" 5	22	"	"	.445	-	0	200	Logged.	Sept. 1-1927
" 6	10	"	"	.1	E	5	200	Some removed	Fall 15-1927
" 7	4	"	"	.1	NE	15	150	Logged 1924	Sept. 2-1927
" 8	8	"	"	.1	SE-	1	150-200	Some. in Logged Set.	July 2-1927
Hickory Creek #1A	20	20E	SW	.001	-	0	Dense Ery. type	Little Disturbance	1927
" " #1B	"	"	"	.001	-	0	"	"	"
" " #2A	"	"	"	.001	-	0	"	"	"
" " #2B	"	"	"	"	-	0	"	"	"
" " #3A	"	"	"	"	-	0	"	"	"
" " #3B	"	"	"	"	-	0	"	"	"
" " #4A	"	"	"	"	-	0	"	"	"
" " #4B	"	"	"	"	-	0	"	"	"
" " #5A	"	"	"	"	-	0	"	"	"
" " #5B	"	"	"	"	-	0	"	"	"
Lamb Creek #1 A	21	"	"	"	-	0	"	"	"
" #1 B	"	"	"	"	-	0	"	"	"
" #2 A	"	"	"	"	-	0	"	"	"
" #2 B	"	"	"	"	-	0	"	"	"
" #3 A	"	"	"	"	-	0	"	"	"
" #3 B	"	"	"	"	-	0	"	"	"
" #4 A	"	"	"	"	-	0	"	"	"
" #4 B	"	"	"	"	-	0	"	"	"
" #5	"	"	"	"	-	0	"	"	"
" #6	"	"	"	"	-	0	"	"	"
Clarkia #1 A	4-5	19E	SW	"	-	0	"	"	"
" #2 A	"	"	"	"	-	0	"	"	"
" #3 A	"	"	"	"	-	0	"	"	"
" #1 B	"	"	"	"	-	0	"	"	"
" #2 B	"	"	"	"	-	0	"	"	"
" #3 B	"	"	"	"	-	0	"	"	"

VI. Individual Area Descriptions

No further details than are given in the plot index table are deemed necessary for this report.

VII. Results of 1927 Inspection

The only results from the 1927 inspections are on areas eradicated in 1926.

These data are summarized in the following table:

VI. Individual Area Descriptions

No further details than are given in the plot index table are deemed necessary for this report.

VII. Results of 1957 Inspection

The only results from the 1957 inspections are on areas eradicated in 1956.

These data are summarized in the following table:

TABLE NO. 24

TABLE NO. 24 (Continued)

Destruction of Eradicated Areas

Name of Plot	Area of Plot (Acres)	Species of Vines	Vines per A. before Eradic.	Vines per A. after Eradic.	Ave. Wt. Vine	Av. ft. L. S. Vine	Time of Eradication.
Bear Gackle #1	.0804	R.lac. - 462.5 R.vis. - 12.5	Results in 1933				Handpulling
" 2	.161	R.lac. - 532.3	"	"	"	"	"
" 3	.109	R.lac. - 5.5.7	"	"	"	"	"
" 4	.134	R.vis. - 983.9 R.lac. - 190.2	"	"	"	"	"
" 5	.449	R.vis. - 131.4 R.lac. - 26.7	"	"	"	"	"
" 6	.1	R.lac. - 150	"	"	"	"	"
" 7	.1	R.lac. - 310	"	"	"	"	"
" 8	.1	R.lac. - 570	"	"	"	"	"
Clarkia # 1A	.001	R.pet. - Solid	77,000	.15	.15	Spraying	
" # 2A	.001	R.pet. - Solid	33,000	.15	.15	"	
" 3A	.001	R.pet. - Solid	83,000	.1	.1	"	
" 1B	.001	R.pet. - Solid	71,000	.2	.2	"	
" 2B	.001	R.pet. - Solid	140,000	.2	.2	"	
" 3B	.001	R.pet. - Solid	152,000	.2	.2	"	
Binarch Cr. #1A	.00025	R.lac. - Heavy	200,000	.1	.1	Handpulling	
" 1B	.00025	R.lac. - Heavy	96,000	.1	.1	"	
" 2A	.00025	R.lac. - Heavy	72,000	.1	.1	"	
" 2B	.00025	R.lac. - ?	-	-	-	Apparently not Disturbed During Erad.	
" 3A	.00025	R.lac. - Heavy	124,000	.1	.1	Handpulling	
" 3B	.00025	R.lac. - ?	4,000 resprouts	.5	2.3	"	
" 4A	.00025	R.lac. - Heavy	32,000	.1	.1	"	
" 4B	.00025	R.lac. - ?	-	-	-	Apparently not disturbed during erad.	
" 5A	.00025	R.lac. - Heavy	156,000	.1	.1	Handpulling	
" 5B	.00025	R.lac. - ?	4,000	.1	.1	"	
Lamb Creek 1A	.001	G.iner.- Heavy	72,000	.1	.1	"	
(Check plot)1B	.001	G.iner.- 0	0	-	-	"	
2A	.001	G.iner.- Heavy	286,000	.1	.1	"	
(Check plot)2B	.001	G.iner.- 0	0	-	-	"	
3A	.001	G.iner.- Heavy	24,000 Seedlings 8,000 Re-sprouts	.1 .9	.1 3.0	"	

TABLE NO. 24 (Continued)

Name of Plot	Area of Plot (Acres)	Species of Ribes	Ribes per A. before Eradic.	Ribes per A. after Eradic.	Ave. Ht. New Ribes	Av.ft L. S. New Ribes	Kind of Eradication
(Check plot)3B	.001	G.iner.-	?	1,000	.9	.9	Handpulling
4A	.001	G.iner.-	Heavy	20,000	.1	.1	"
4B	.001	G.iner.-	0	0	-	-	"
#5	.001	G.iner.-	Heavy	35,000	.15	.15	"
#6	.001	G.iner.-	"	37,000	.1	.1	"
Gold Hill #1	.1	R.vis. -	1,700	Results	in 1925		

Some of the areas studied from this standpoint are illustrated in other reports of this project.

W10 of this project report shows an area observed in 1925 which had obviously been disturbed in 1924. The area where the picture was taken had been eradicated in 1924, so the new Ribes seedlings were probably resultant therefrom.

W292 of this project report shows an area observed in 1927, which had been eradicated in 1926. The old bushes, which had been pulled from this spot, were found beside the area photographed. 178 R. lacustre seedlings were counted on the area shown.

The areas on which results were obtained in 1927 indicate that stream type eradication requires intensive study during the coming seasons.

All available data indicate that eradication of stream type by any present method results in multiplied germination of large quantities of Ribes seeds wherever the duff mantle is disturbed.

Studies on upland areas are under observation, but no data will be available until the summer of 1928.

VIII. Summary

Handpulling and chemical eradication of Ribes from areas of stream type both appear to actually increase the number of Ribes in areas of R. petiolare, R. lacustre and G. inermis. This condition appears to be general on hand-pulled areas observed, and intermittently true on the chemically eradicated areas observed.

The new Ribes on the hand eradicated areas are quite definitely the result of duff disturbance. The examination of the seedlings on chemically eradicated lands is incomplete, and no explanation will be attempted until these studies have been completed.

Studies on upland areas are under observation, but no data are yet available.

Some of the areas studied from this standpoint are illustrated in other reports of this project.

W10 of this project report shows an area observed in 1925 which had obviously been disturbed in 1924. The area where the picture was taken had been cultivated in 1924, so the new Ribes seedlings were probably resultant therefrom.

W252 of this project report shows an area observed in 1927, which had been eradicated in 1926. The old bushes, which had been pulled from this spot, were found beside the area photographed. LY5 R. laevigatum seedlings were counted on the area shown.

The areas on which results were obtained in 1927 indicate that stream type eradication requires intensive study during the coming seasons.

All available data indicate that eradication of stream type by any present method results in multiplied germination of large quantities of Ribes seeds wherever the duff mantle is disturbed.

Studies on upland areas are under observation, but no data will be available until the summer of 1928.

VIII. Summary

Handpulling and chemical eradication of Ribes from areas of stream type both appear to actually increase the number of Ribes in areas of R. petiolare, R. lacustre and R. hirtellum. This condition appears to be general on [illegible]-pulled areas observed, and intermittently true on the chemically eradicated areas observed.

The new Ribes on the hand eradicated areas are quite definitely the result of duff disturbance. The examination of the seedlings on chemically eradicated lands is incomplete, and no explanation will be attempted until these studies have been completed.

Studies on upland areas are under observation, but no data are yet available.

ROOT COMPETITION STUDY

I. Definition of the Experiment

This experiment is a systematic study of forested areas to determine the relative effects of (1) root competition (2) light (3) duff disturbance, each considered separately, and the effects of the different combinations of two or more of these factors, on the vegetative ground cover, and, more specifically, on the growth of Ribes.

II. Description of Basis Used in Selecting Experimental Units

Most of the areas studied were selected because of the relative or entire absence of shrubby and herbaceous ground cover from the area. Against each study plot on which natural conditions were altered, a check plot as nearly identical as possible was established closely adjoining the study plot.

III. Methods of Study

The greater number of the areas established are checks on root competition only. For this phase of the study, the experimental areas were laid out as follows: Each plot consists of one or more square milacres, the ideal having no plant growth whatever within its boundaries. In practice, areas without a single plant of any size can seldom be located. The areas used had the least vegetation in their immediate vicinity. All plots for this experiment are limited to areas having no established coniferous vegetation inside the plot boundaries.

Permanent surfaced cedar stakes were driven at each corner of every milacre. An undisturbed check plot was established closely adjoining each experimental unit. The duff surface of the experimental plots was carefully protected from disturbance of any kind. Aside from driving the stakes at the plot corners, the plot itself was not molested. Encircling the experimental plot and 6" from the actual plot boundaries, a trench 6" wide and 24" deep was made which severed all roots within that depth entering the plot from outside. The location and species of each plant then growing on the plot was mapped on a scale of 2 inches to 6.6 feet.

ROOT COMPETITION STUDY

I. Definition of the Experiment

This experiment is a systematic study of forested areas to determine the relative effects of (1) root competition (2) light (3) dust disturbance, each considered separately, and the effects of the different combinations of two or more of these factors, on the vegetative ground cover, and, more specifically, on the growth of Ribes.

II. Description of Basis Used in Selecting Experimental Plots

Most of the areas studied were selected because of the relative or entire absence of shrubby and herbaceous ground cover from the area. Against each study plot on which natural conditions were altered, a check plot as nearly identical as possible was established closely adjoining the study plot.

III. Methods of Study

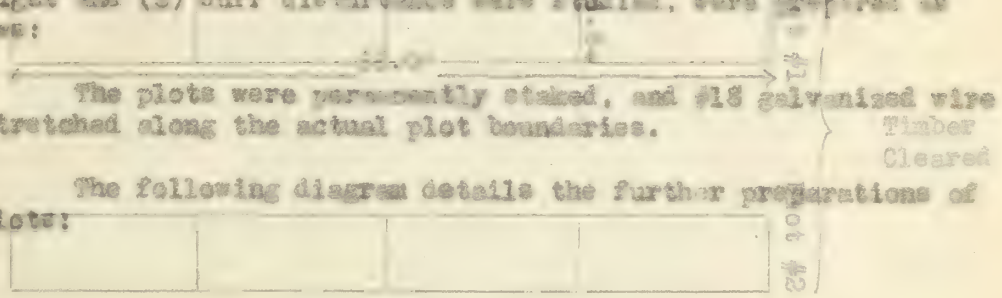
The greater number of the areas established are checks on root competition only. For this phase of the study, the experimental areas were laid out as follows: Each plot consists of one or more square milacres, the ideal having no plant growth whatever within its boundaries. In practice, areas without a single plant of any size can seldom be located. The areas used had the least vegetation in their immediate vicinity. All plots for this experiment are limited to areas having no established coniferous vegetation inside the plot boundaries.

Permanent surfaced cedar stakes were driven at each corner of every milacre. An undisturbed check plot was established closely adjoining each experimental unit. The duff surface of the experimental plots was carefully protected from disturbance of any kind. Aside from driving the stakes at the plot corners, the plot itself was not molested. Encircling the experimental plot and 6" from the actual plot boundaries, a trench 6" wide and 24" deep was made which severed all roots within that depth entering the plot from outside. The location and species of each plant then growing on the plot was mapped on a scale of ½ inches to 6.6 feet.

Root Competition
Light
Duff Disturbance

No other work was done on the plots.

Those plots on which the factors of (1) root competition (2) light and (3) duff disturbance were studied, were prepared as follows:



The plots were permanently staked, and #18 galvanized wire was stretched along the actual plot boundaries.

The following diagram details the further preparations of the plots:

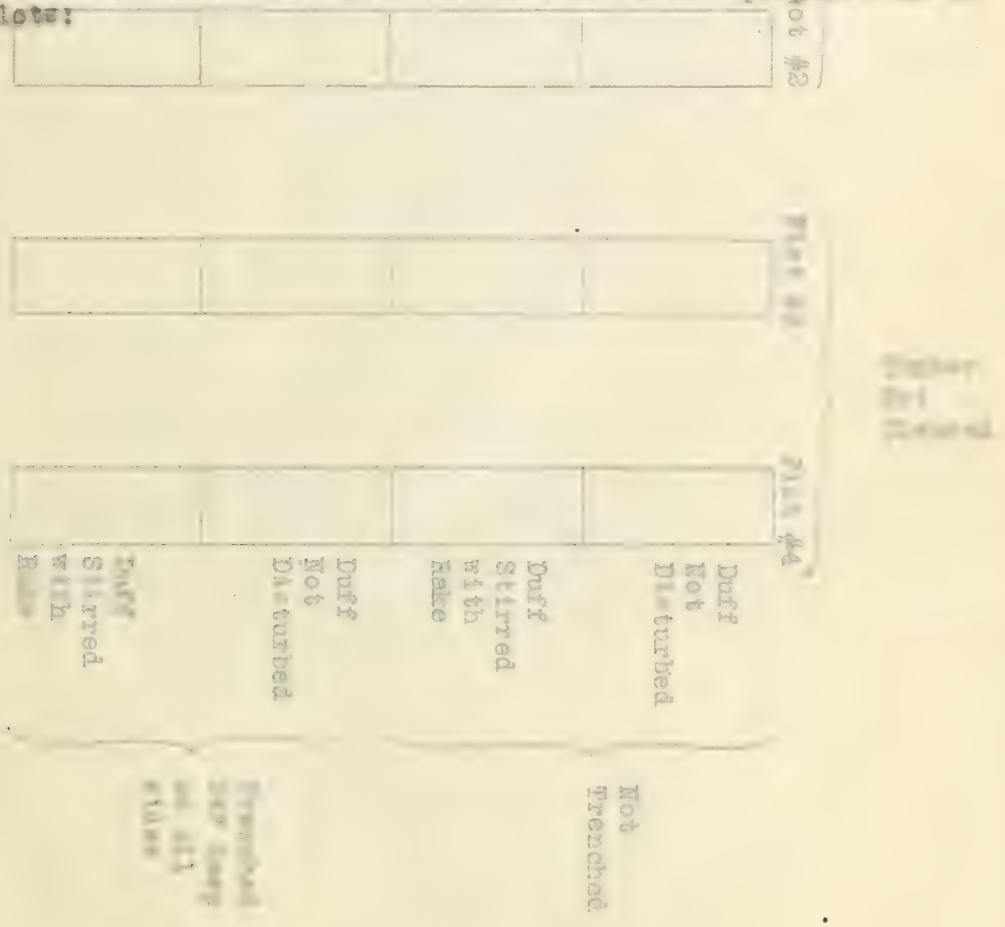
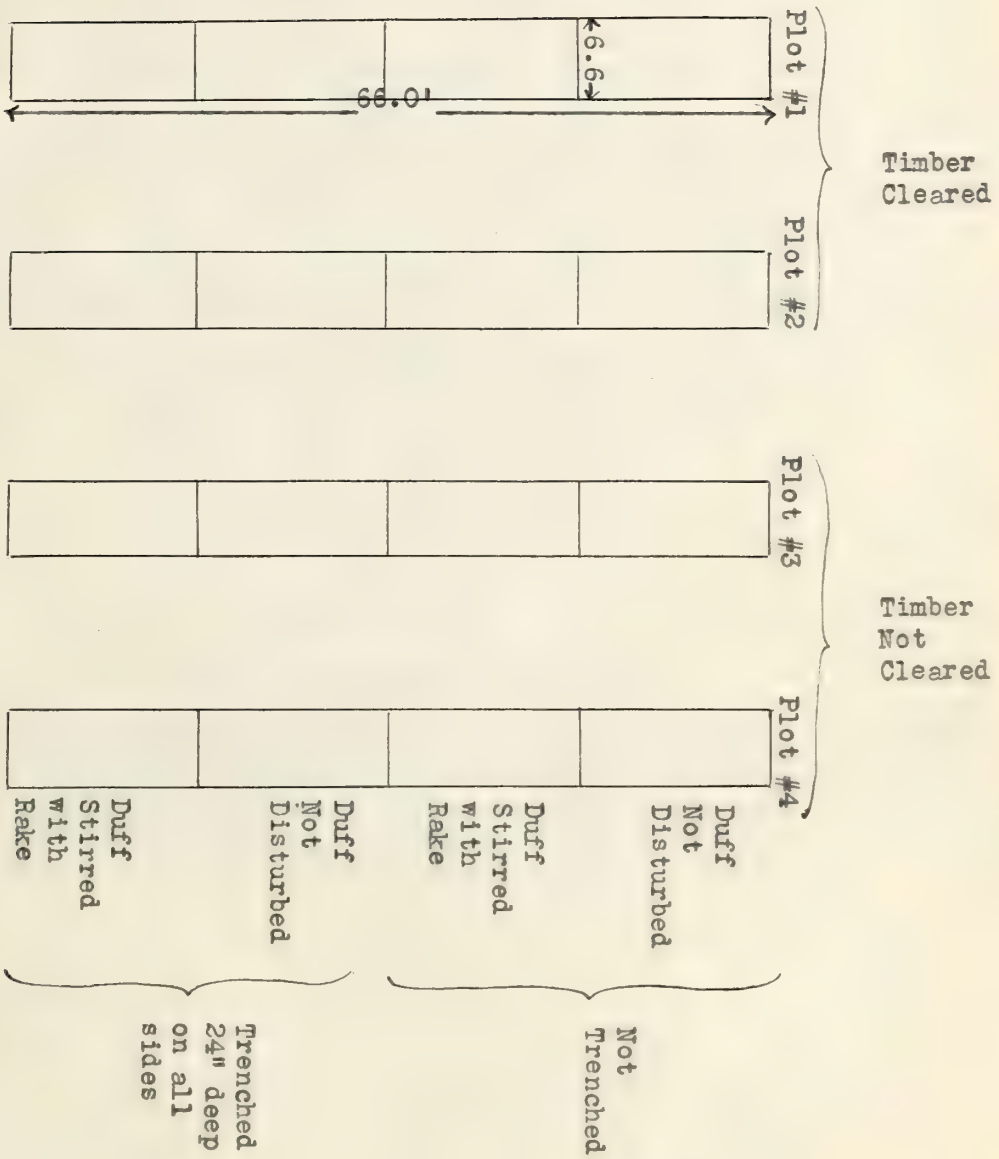


Diagram of { Root Competition / Light / Duff Disturbance } Experiment.



IV. Plot Index

TABLE NO. 25

Root Competition Study Areas

Name of Plot	Location of Plot S	T	R	Slope Dir.	%	Timber Age Class	No. Mil-acres	Date Established
Lakeview #1	9	53N	1W	-	0	40	2	Aug. 24 - 1927
" 2	"	"	"	-	0	40	2	" "
" 3	"	"	"	-	0	40	2	" "
" 4	"	"	"	-	0	40	2	" "
Meadow Creek#1	14	42N	3W.	E	?	160-200	6	June 25-Sept.12-1927
" 2	"	"	"	"	?	"	3	" " "
" 3	"	"	"	NE	?	"	2	" " "
" 4	"	"	"	"	?	"	1	" " "
" 5	"	"	"	"	?	"	2	" " "
" 6	"	"	"	"	?	"	2	" " "
" 7	"	"	"	"	?	"	2	" " "

TABLE NO. 26

Root Competition - Light Study Areas

Lakeview # 4	9	53N	1W	-	0	40	2	Aug. 24 - 1927
Meadow Creek#1	9	42N	3W	NE	?	20-40	10	June 23 - 29- "
" 2	9	"	"	"	?	"	10	" " "
" 3	"	"	"	"	?	"	10	June 23 - "
" 4	"	"	"	"	?	"	10	" " "

IV. Plot Index

TABLE NO. 25

Root Competition Study Areas

Name of Plot	Location of Plot S	T	R	Slope Dir.	%	Timber Age Class	No. Mil-acres	Date Established
Lakeview #1	9	SEW	1W	-	0	40	2	Aug. 24 - 1927
" 2	"	"	"	-	0	40	2	" " "
" 3	"	"	"	-	0	40	2	" " "
" 4	"	"	"	-	0	40	2	" " "
Meadow Creek #1	14	42W	7E	W	7	160-200	6	June 25-Sept.12-1927
" 2	"	"	"	"	7	"	2	" " "
" 3	"	"	"	NE	7	"	2	" " "
" 4	"	"	"	"	7	"	1	" " "
" 5	"	"	"	"	7	"	2	" " "
" 6	"	"	"	"	7	"	2	" " "
" 7	"	"	"	"	7	"	2	" " "

TABLE NO. 26

Root Competition - Light Study Areas

Lakeview # 4	9	SEW	1E	-	0	40	2	Aug. 24 - 1927
Meadow Creek #1	3	42W	7E	NE	7	80-40	10	June 25 - Sept. "
" 2	8	"	"	"	7	"	10	" " "
" 3	4	"	"	"	7	"	10	June 25 - "
" 4	"	"	"	"	7	"	10	" " "

V. Individual Area Descriptions

These experiments were established in two general regions near Lakeview, Idaho and near Harvard, Idaho.

The plots at Lakeview, Idaho, are situated on a high level terrace of lacustrine origin. This terrace is about 300 feet above the present lake level and the soil is a deep gravelly loam. It has a very slight drop to the northeastward, but appears practically level.

The timber is a 40-year stand of larch and Douglas fir with an understory of cedar and white pine. The area is fully stocked with timber and the brushy undergrowth is on the decline. The stand is Ribes free, but wherever the duff has been disturbed, a new Ribes generation has in all instances germinated immediately. The species of plants forming the ground cover are listed below in the order of their abundance.

Claytonia uniflora
Pachystima myrsinites
Rubus parviflorus
Spiraea lucida
Linnaea borealis

This ground cover has an average density of about 25 per cent. Most of the duff mantle is free of all low vegetation.

The plots near Harvard, Idaho, are on two distinct types of timber areas.

The Root Competition Meadow Creek Plots #1 to #7 are in a 160-200 year dense stand of mature white pine type. The areas are situated on a steep easterly slope of deep residual silty or clayey soil. There is very little underbrush within the stand, and the plots are usually located on the least vegetated areas which filled the remaining specifications for the experiment. The stand is Ribes free.

The Root Competition and Light Plots Meadow Creek #1 to #4 are in a 30-year dense stand of white pine type on the same steep easterly slope as is described in the preceding paragraph. The only marked difference between the two areas is in the vegetative cover. Old Ribes bushes still persist throughout the stand, although the underbrush is generally rather sparse and scraggly. The Ribes which still persist in this stand include both R. viscosissimum and R. lacustre and are in most instances decadent.

VI. Results of 1927 Inspection

No results from this experiment were obtained during the past year. So far as observations and records were made during 1927 no pronounced change in the surface vegetation was evident on any of these prepared plots.

VII. Summary

No data are yet available on this experiment.

V. Individual Area Descriptions

These experiments were established in two general regions near Lakeview, Idaho and near Harvard, Idaho.

The plots at Lakeview, Idaho, are situated on a high level terrace of Lacustrine origin. This terrace is about 300 feet above the present lake level and the soil is a deep gravelly loam. It has a very slight drop to the northeastward, but appears practically level.

The timber is a 40-year stand of larch and Douglas fir with an understory of cedar and white pine. The area is fully stocked with timber and the brushy undergrowth is on the decline. The stand is Ribes free, but wherever the duff has been disturbed, a new Ribes generation has in all instances germinated immediately. The species of plants forming the ground cover are listed below in the order of their abundance.

Claytonia sibirica
Pachystima myrsinites
Rubus parviflorus
Spiraea lucida
Linnaea borealis

This ground cover has an average density of about 85 per cent. Most of the duff mantle is free of all low vegetation.

The plots near Harvard, Idaho, are on two distinct types of timber areas.

The Root Competition Meadow Creek Plots #1 to #7 are in a 150-200 year dense stand of mature white pine type. The areas are situated on a steep southerly slope of deep residual silty or clayey soil. There is very little understory within the stand, and the plots are usually located on the least vegetated areas which filled the remaining specifications for the experiments. The stand is Ribes free.

The Root Competition and Light Plots Meadow Creek #1 to #4 are in a 30-year dense stand of white pine type on the same steep southerly slope as is described in the preceding paragraph. The only marked difference between the two areas is in the vegetative cover. Old Ribes bushes still persist throughout the stand, although the understory is generally rather sparse and scraggly. The Ribes which still persist in this stand include both R. viscosissimum and R. lacustre and are in most instances deceased.

VI. Results of 1927 Inspection

No results from this experiment were obtained during the past year. So far as observations and records were made during 1927 no pronounced change in the surface vegetation was evident on any of these prepared plots.

VII. [illegible]

No data are yet available on this experiment.

LIFE HABITS OF RIBES

I. Definition of the Experiment

This is the aggregate of many individual observations pertaining to the life habits of Ribes. The various observations are presented in the chronological order according to the life cycle of the plant. By means of these and additional observations it is hoped to more completely visualize the life habits of each Ribes species.

II. Description of Bases Used in Selecting Experimental Units

Points of observation for this study were selected only after particular conditions had been found to exist at any given locations. Most of the crucial facts were encountered and noted only in an incidental way, while primarily working on some other systematic study.

III. Methods of Study

Specific instructions were issued to all field men on the project to definitely record all observations of unusual conditions, on all occasions. Systematic efforts to answer some particular points were made during the entire season.

IV. Plan for Recording Data

Whenever possible the newly observed conditions were recorded on forms WF #35 and #36. Otherwise, the records were a simple statement of the conditions found.

V. Plot Index

No plots were established for this study, the data taken coming entirely through observations incidental to other experiments.

VI. Individual Area Descriptions

Individual area descriptions are briefly stated in connection with each observation stated in this report under the next heading.

VII. Results of 1927 Inspection

So far as observations in the Inland Empire are concerned, Ribes bushes burst their buds earlier than any other associated group of woody plants. This indicates that the physiological processes begin in Ribes at a lower temperature. In 1927, R. viscosissimum was found in leaf in 22 inches of snow on April 27. Even those buds which were below the top of the snow had opened out. This is shown in the accompanying photograph, "W383".

I. Definition of the Experiment

This is the study of many individual observations pertaining to the life habits of Ribes. The various observations are presented in the chronological order according to the life cycle of the plant. By means of these and additional observations it is hoped to more completely visualize the life habits of each Ribes specie.

II. Description of Areas Used in Selecting Experimental Plots

Points of observation for this study were selected only after particular conditions had been found to exist at any given location. Most of the crucial facts were encountered and noted only in an incidental way, while primarily working on some other systematic study.

III. Methods of Study

Specific instructions were issued to all field men on the project to definitely record all observations of unusual conditions on all occasions. Systematic efforts to answer some particular points were made during the entire season.

IV. Plan for Recording Data

Whenever possible the newly observed conditions were recorded on forms W #2 and #2A. Otherwise, the records were a simple statement of the conditions found.

V. Plot Index

No plots were established for this study, the data taken coming entirely through observations incidental to other experiments.

VI. Individual Area Descriptions

Individual area descriptions are briefly stated in connection with each observation stated in this report under the next heading.

VII. Results of Life Cycle Investigations

So far as observations in the Inland Empire are concerned, Ribes buries buds their buds earlier than any other associated group of woody plants. This indicates that the physiological processes begin in Ribes at a lower temperature. In 1927, R. viscosissimum was found in leaf in 12 inches of snow on April 27. When these buds which were below the top of the snow had opened out. This is shown in the accompanying photograph, "RS".

Numerous observations in previous years have also shown that Ribes come out into leaf before any associated shrub or tree.

The first recorded appearance above ground of the new seedling Ribes is June 15th, but it is believed that further observations will advance that date by at least 2 weeks. Data now on hand show that Ribes seedlings may come through the ground during the entire season until as late as October 15.

Of 1,635 Ribes seedlings carefully examined in June, 1927, to locate the position of the crown (the location of the seed from which each seedling came) in the duff and soil section, a total of 1,614, or 98.7+ % had their crowns in the basal 1/10 inch of the duff, while 21 or 1.2+ % had their crowns well up into the duff mantle. None were found with the crown below the top of the mineral soil.

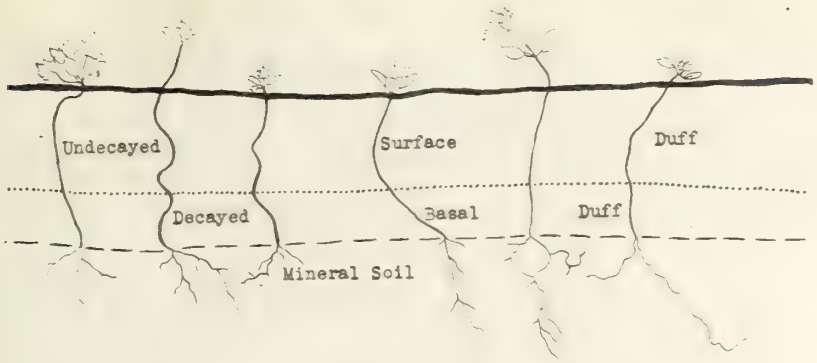


Numerous observations in previous years have also shown that tubes come out into leaf before any associated shrub or tree.

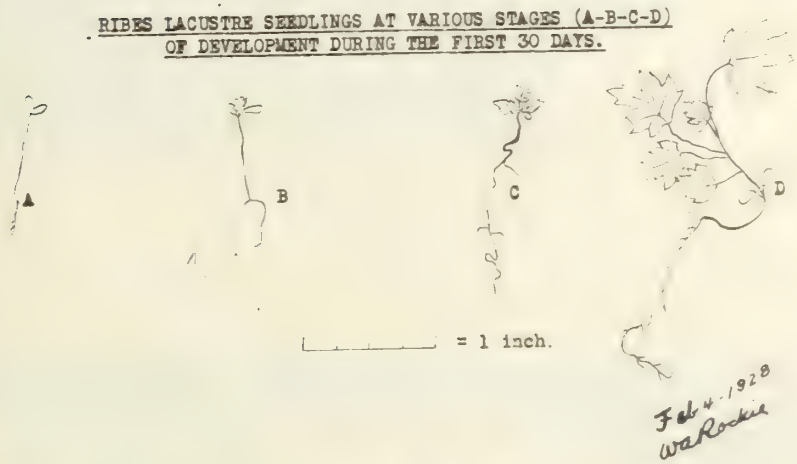
The first recorded appearance above ground of the new seedling tubes is June 17th. But it is believed that further observations will advance that date by at least 2 weeks. Data now on hand show that tubes seedlings may come through the ground during the entire season until as late as October 15th.

Of 1,855 tubes seedlings carefully studied in June, 1917, to locate the position of the crown (the junction of the root from which each seedling came) in the duff and soil sections, a total of 1,814, or 98.7% had their crowns in the total 1/2 inch of the duff, while 21 or 1.3% had their crowns well up into the duff zone were found with the crown below the top of the mineral soil.

GROWTH OF RIBES SEEDLINGS RELATIVE TO THE SEVERAL LAYERS OF THE SOIL SECTION



RIBES LACUSTRE SEEDLINGS AT VARIOUS STAGES (A-B-C-D) OF DEVELOPMENT DURING THE FIRST 30 DAYS.





W383. R. viscosissimum in leaf in 22 inches of snow 6 miles east of Santa, Idaho, on April 27, 1927. The standing stick is 36 inches in length, and its base is touching the ground beneath the snow. The leaf buds beneath the snow were also in leaf.

W383



W594. Meadow Creek Burn #1. An R. viscosissimum in its third year. The muslin background is three feet wide.



W706 R. viscosissimum which germinated in 1926. Recorded in September 1927. Part of root was lost while pulling the bush.

1926 growth is single stem from crown A to point B.

1927 growth is all other stems.

The most vigorously growing individual bushes were not all found in a single locality. The most vigorous two-year-old R. viscosissimum stand was found on Lakeview Burn # 1, but the most vigorous individual R. viscosissimum bush was found on Meadow Creek Burn # 1.

The maximum size attained by these newly germinated Ribes in their early years is indicated by the following instances:

R. lacustre. Plant germinated in 1926, and attained a live stem of 17.25' during that year. On June 29, 1927, the plant had 103.2' of live stem with a new growth of 85.9'. Meadow Creek Burn # 1.

R. viscosissimum. Plant germinated in 1925, and attained a live stem of 9.0' during that year. In July, 1926, the plant had 43.2' of live stem, with a new growth of 34.2'. Meadow Creek Burn # 1.

The minimum sizesattained by other individual plants of the same species are fully as striking for the absence of linear increase.

In 1926 all Ribes fruits were gathered after August 20th. In 1927, Ribes fruits were gathered during late July, August and early September.

Ripe fruits were noted on the bushes from July 14 to September 14 inclusive.

Approximately 100 fruits each of R. viscosissimum and R. lacustre were broken, and the enclosed seeds within each were accurately counted. The results were as follows:

TABLE NO 27

Counts of Ribes Seeds in Individual Fruits

	No. Fruits Used As Basis	Maximum No. Seeds per Fruit	Minimum No. Seeds per Fruit	Average No. Seeds per Fruit
R. visco.	101	162	5	50.1
R. lacust.	102	55	0	8.1

The most vigorously growing individual bushes were not all found in a single locality. The most vigorous two-year-old R. viscosissimum stand was found on Lakeview Burn # 1, but the most vigorous individual R. viscosissimum bush was found on Meadow Creek Burn # 1.

The maximum size attained by these newly germinated Ribes in their early years is indicated by the following instances:

R. lacustre. Plant germinated in 1926, and attained a live stem of 17.35' during that year. On June 29, 1927, the plant had 108.2' of live stem with a new growth of 85.9'. Meadow Creek Burn # 1.

R. viscosissimum. Plant germinated in 1925, and attained a live stem of 9.0' during that year. In July, 1926, the plant had 43.2' of live stem, with a new growth of 34.2'. Meadow Creek Burn # 1.

The minimum size attained by other individual plants of the same species are fully as striking for the absence of linear increase.

In 1926 all Ribes fruits were gathered after August 20th. In 1927, Ribes fruits were gathered during late July, August and early September.

Ripe fruits were noted on the bushes from July 14 to September 14 inclusive.

Approximately 100 fruits each of R. viscosissimum and R. lacustre were broken, and the enclosed seeds within each were accurately counted.

The results were as follows:

TABLE NO 27

Counts of Ribes Seeds in Individual Fruits

	No. Fruits Used As Basis	Maximum No. Seeds per Fruit	Minimum No. Seeds per Fruit	Average No. Seeds per Fruit
R. visco.	107	152	5	80.7
R. lacust.	100	84	0	8.7

A clump of 1926 R. viscosissimum seedlings which numbered 212 was found in 1926. The stems of all were in a solid bundle, the diameter of this bundle being .14 of an inch, the manner of growth indicating that the 212 plants were from the seeds of an individual fruit. In 1927, only 142 of these Ribes seedlings were still alive.

Assuming that the average Ribes plant which attains maturity, fruits for an average period of 10 years, and using the figures in the three preceding tables, the seed production during these assumed producing years of a Ribes bush is as follows:

TABLE NO. 28

Production of Ribes Seeds

No. Fruiting Years of Average Bush	No. Fruits Produced per Ribes per Year	Average No. Seeds per Fruit	Total No. Seeds Produced in 10 years by an Average R. visco.
10	15.8	50.1	7,915.8

These figures are very conservative, since the fruit count was made after the fruits had begun to fall during a year which was noticeably one of less than average fruiting.

In connection with the gathering of R. viscosissimum fruits the past season, the live stem, dead stem, and new growth for the different aged plants from which fruits were collected averaged as follows:

A clump of 1928 R. viscosissimum seedlings which numbered 217 was found in 1929. The stems of all were in a solid bundle, the diameter of this bundle being .1¢ of an inch, the manner of growth indicating that the 217 plants were from the seeds of an individual fruit. In 1937, only 142 of these Ribes seedlings were still alive.

Assuming that the average Ribes plant which attains maturity, fruits for an average period of 10 years, and using the figures in the three preceding tables, the seed production during these assumed producing years of a Ribes bush is as follows:

TABLE NO. 28

R. viscosissimum Production of Ribes Fruit

No. Fruiting Years of Average Bush	No. Fruits Produced per Ribes per Year	No. Seeds per Fruit	Average Produced in 10 Years by an Average R. viscosissimum Bush.
10	15.8	50.1	7,915.8

These figures are very conservative, since the fruit count was made after the fruits had begun to fall during a year which was noticeably one of less than average fruiting.

In connection with the gathering of R. viscosissimum fruits the past season, the live stem, dead stem, and new growth for the different aged plants from which fruits were collected averaged as follows:

TABLE NO. 29

R. viscosissimum Bushes from Which Fruits Were Gathered

Year of Germination of Ribes	No. of Ribes as Basis	Average Live Stem in Feet	Average Dead Stem in Feet	Average New Growth in Feet	Age of Bush in Years	Average Number Fruits
1923	5	19	3	2	5	14.6
1922	28	25	5	4	6	14.0
1921	49	31	6	3	7	14.0
1920	73	39	7	4	8	14.3
1919	27	54	11	5	9	20.0
1918	13	58	13	7	10	14.8
1917	9	79	14	7	11	19.3
1916	2	41	11	7	12	19.0
1915	2	30	22	6	13	11.0
Average of All	207	39	8	5		15.8

On October 18 and October 29, 1927, the litter which had accumulated on the muslin plot covers at Lakeview and Gold Hill was sorted and the fine residues which might contain seeds were sacked. These were submitted to the Seed Testing Laboratory of the Bureau at Washington for identification. The results as given by the laboratory were as follows:

Seeds Deposited on Plot Covers in 1927

Lakeview Study # 1 - Mixture:
Betula sp
Catkins and seeds of spruce or larch.
Bull thistle
Buds of some tree (probably a conifer)

Lakeview Study # 2 - Mixture:
Betula sp
Catkins and seeds of spruce or larch
Buds of some conifer

Lakeview Study # 3 - Mixture:
Betula sp
Bull thistle
Seeds of spruce or larch
Buds of some conifer

Gold Hill Plot # 1 - Mixture:
Betula sp.
Acer sp.
Seeds of spruce or larch
Buds of some conifer

TABLE No. 15

7. Vegetation Cored from Pitch Pine Cylinder

Year of Germination of Pines	No. of Pines as Seen	Average Live Stem Dead Stem in Feet	Average Mean Growth in Feet	Age of Pines in Years	Average Number Trunks
1853	5	19	3	5	14.8
1859	24	25	5	6	14.7
1861	49	31	6	7	14.2
1865	73	35	7	8	14.5
1918	47	54	11	5	20.0
1918	12	65	12	7	14.1
1917	3	75	14	9	15.1
1919	8	41	11	7	15.7
1919	6	70	25	8	11.0
Average of All	207	39	8	5	15.6

On October 14 and October 25, 1924, the lichens which had accumulated on the muslin plot covers at Lakeview and Gold Hill was sorted and the three species which might contain seeds were sacked. These were submitted to the Seed Testing Laboratory of the Bureau at Washington for identification. The result as given by the laboratory were as follows:

Seeds Reported on Plot Covers in 1917

Lakeview Study # 1 - Mixture:
Betula sp
Catkins and seeds of spruce or larch.
Bull thistle
Buds of some tree (probably a conifer)

Lakeview Study # 2 - Mixture:
Betula sp
Catkins and seeds of spruce or larch
Buds of some conifer

Lakeview Study # 3 - Mixture:
Betula sp
Bull thistle
Seeds of spruce or larch
Buds of some conifer

Gold Hill Plot # 1 - Mixture:
Betula sp.
Acer sp.
Seeds of spruce or larch
Buds of some conifer

Gold Hill Plot # 3 - Mixture:
Seeds of spruce or larch
The rest of the material in this sample is not seeds.

This material is obviously carried hither either by wind or by birds. From the results of the laboratory identification and from the nature of the stands in which the deposits occurred, it appears likely that the material is all wind-blown.

Gold Hill Plot # 1 is the area on which many Ribes had germinated between September 14 and October 29. The entire absence of Ribes seeds from the plot cover during and preceding this period of germination, lends strong support to the theory that birds and wind are negligible factors in the distribution of Ribes. This plot cover was placed on July 20 and was removed October 29, thus including practically the entire fruiting season. The immediate spot was without fruiting Ribes, but many thousands of fruiting bushes are present within a mile of this site.

Ribes fruits were gathered primarily for carrying on germination under laboratory conditions. This work has been done by Dr. E. W. Hubert of the School of Forestry at the University of Idaho. Some tests have been completed, but most of the tests are still in progress.

Dr. Hubert's report of his work is presented separately on a later page.

The native Ribes species of northern Idaho show certain general characteristics regarding growth habits which appear very definite. R. viscosissimum may grow on all residual soil areas, occurs frequently on the well drained terrace soils, but very seldom on alluvial bottomlands.

R. lacustre may grow at any point where the water table is sufficiently close to the soil surface during the early summer for the plant roots to secure a reserve food supply.

R. petiolare may grow at any point on moist alluvial or lacustrine bottomlands.

G. inermis generally grows on moist alluvial or lacustrine bottom lands which are subject to spring overflow.

Many shrubby and herbaceous plant species are more or less closely associated with Ribes in north Idaho. Relatively few of these species, however, are constant associates of the Ribes species. The

Gold Hill Plot # 3 - Mixture:
Seeds of spruce or larch
The rest of the material in
this sample is not seeds.

This material is obviously carried hither either by wind or by birds. From the results of the laboratory identification and from the nature of the stands in which the deposits occurred, it appears likely that the material is all wind-blown.

Gold Hill Plot # 1 is the area on which many Ribes had germinated between September 14 and October 25. The entire absence of Ribes seedls from the plot cover during and preceding this period of germination, lends strong support to the theory that birds and wind are negligible factors in the distribution of Ribes. This plot cover was placed on July 20 and was removed October 25, thus including practically the entire fruiting season. The immediate spot was without fruiting Ribes, but many thousands of fruiting bushes are present within a mile of this site.

Ribes fruits were gathered primarily for carrying on germination under laboratory conditions. This work has been done by Dr. C. E. Hubert of the School of Forestry at the University of Idaho. Some tests have been completed, but most of the tests are still in progress.

Dr. Hubert's report of his work is presented seperately on a later page.

The native Ribes species of northern Idaho show certain general characteristics regarding growth habits which appear very definite. R. viscosissimum may grow on all residual soil areas, occurs frequently on the well drained terrace soils, but very seldom on alluvial bottomlands.

R. laxiflore may grow at any point where the water table is sufficiently close to the soil surface during the early summer for the plant roots to secure a reserve food supply.

R. petiolare may grow at any point on moist alluvial or lacustrine bottomlands.

R. inerme generally grows on moist alluvial or lacustrine bottom lands which are subject to spring overflow.

Many shrubby and herbaceous plant species are more or less closely associated with Ribes in north Idaho. Relatively few of these species, however, are constant associates of the Ribes species. The

following list of 82 plants represents the usual associates of Ribes.

Those species which are most commonly associated with Ribes are marked with a *. Those plant species which might readily be confused with Ribes are marked with an X. (These symbols are placed between the Latin and the common names.)

The following list of 82 plants represents all associates encountered during the past season:

List of Plants Common in Western White Pine Stands

Latin Name	English Name	Symbol
Acer glabrum	X*Mt. Maple	A. G.
Aconitum columbianum	X*Monkshood	A. C.
Actea rubra	X Baneberry	A. R.
Adenocaulon bicolor		A. B.
Alnus sinuata	* Alder	A. S.
Alnus tenuifolia	* Alder	A. T.
Amerlanchier alnifolia	* Service berry	A. A.
Aralia nudicaulis	Wild sasaparilla	A. N.
Arnica cordifolia	Wild arnica	An. C.
Astragalus sp.	Wild Pea	
Berberis repense	*Oregon grape	B. R.
Betula papyrifera	*Birch	B. P.
Betula glandulosa	Bog birch	B. G.
Castilleja miniata	*Indian paint brush	C. M.
Castilleja suskisdorfii	*Indian paint brush	C. Su.
Castilleja augustifolia	*Indian paint brush	C. A.
Ceanothus velutinus	*Laurel	C. V.
Ceanothus sanguineus	*Laurel	C. S.
Chimaphylla umbellata	*Prince's Pine	C. U.
Claytonia uniflora	*Spring beauty	C. Un.
Clematis occidentalis	Clematis	C. O.
Coptis occidentalis	X*Gold thread	C. O.
Cornus stolonifera	Dogwood	C. Sa.
Cornus canadensis	*Dogwood	C. C.
Carduus lanceolatum	*Bull thistle	
Disporum trachycarpum	*Solmon's seal	D. T.
Epilobium augustifolium	*Fireweed	E. A.
Galium aparine	Cleavers	G. A.
Grass		G. R.
Geum Macrophyllum	Geum	
Holodiscus discolor	*Ocean spray	H. D.
Kalmia glauca	American laurel	K. G.
Ledum glandulosum	Squaw tea	L. G.
Linnaea borealis	*Twin flower	L. B.
Lonicera utahensis	Red twinberry	L. U.
Lonicera involucrata	Black twinberry	L. I.
Menziesia ferrunginea	False huckleberry	M. F.
Mertensia lanceolata	Lungwort	M. L.

The following list of 82 plants represents all associates encountered during the past season:

List of Plants Common in Western White Pine Stands

Latin Name	English Name	Symbol
Acer glabrum	Y*E. Maple	A. G.
Aconitum columbianum	Y*Monkshood	A. C.
Actea rubra	X Baneberry	A. R.
Adenocaulon bicolor	/	A. B.
Alnus sinuata	* Alder	A. S.
Alnus tenuifolia	* Alder	A. T.
Amelanchier alnifolia	* Service berry	A. A.
Aralia nudicaulis	Wild sasaparilla	A. N.
Arnica cordifolia	Wild arnica	Ar. C.
Asplenium sp.	Wild fern	
Berberis repens	*Oregon grape	B. R.
Betula papyrifera	*Birch	B. P.
Betula glandulosa	Bog birch	B. G.
Castilleja miniata	*Indian paint brush	C. M.
Castilleja pruinadorii	*Indian paint brush	C. P.
Castilleja sanguinifolia	*Indian paint brush	C. A.
Ceanothus velutinus	*Snowbrush	C. V.
Ceanothus sanguineus	*Redroot	C. S.
Chimaphila umbellata	*Prince's Pine	C. U.
Clintonia uniflora	*Queen Cup	C. Un.
Clematis occidentalis	Clematis	C. O.
Coptis occidentalis	Goldthread	C. C.
Cornus stolonifera	Dogwood	C. S.
Cornus canadensis	*Dogwood	C. C.
Corydalis sempervirens	*Pink Fumitory	C. S.
Disporum trachycarpum	*Solomon's seal	D. T.
Epilobium angustifolium	*Fireweed	E. A.
Galium sparine	Cleavers	G. A.
Grass		G. Gr.
Gum Macrophyllum	Gum	
Holodiscus discolor	*Ocean Spray	H. D.
Kalmia glauca	Western Laurel	K. G.
Ledum glandulosum	Labrador tea	L. G.
Linnaea borealis	*Twin flower	L. B.
Lonicera utahensis	Red twinberry	L. U.
Lonicera involucrata	Black twinberry	L. I.
Menziesia ferruginea	False huckleberry	M. F.
Mertensia lanceolata	Lungwort	M. L.

The following list of 82 plants represents the usual associates of Ribes.

These species which are most commonly associated with Ribes are marked with a *. These plant species which might readily be confused with Ribes are marked with an X. (These symbols are placed between the Latin and the common names.)

Latin Name	English Name	Symbol
Mitella sp.	*	
Monesis uniflora	Shin leaf	M. U.
Monotropa uniflora	Ghost flower	M. Un.
Montia linearis	Small spring beauty	M. L.
Oplopanax horridum	Devil's club	D. H.
Pachistima Myrsinites	*Buckbrush	P. M.
Peramium secundis	Rattlesnake plantain	P. S.
Philadephus lewisii	Mock orange (Syringa)	P. L.
Physocarpus pauciflorus	X*Ninebark	P. P.
Potentilla glaucophylla	Cinquefoil	P. G.
Prunella vulgaris	Heal All	
Prunus demissa	Choke cherry	P. D.
Prunus emarginata	Wild cherry	P. E.
Pteridium aguilinum	*Bracken Fern	
Pyrola rotundifolia	Shin leaf	P. R.
Ranunculus platyphylla	Buttercup	R. Pl.
Rhamnus purshiana	*Cascara	Rh. P.
Rhamnus alnifolia	Alder-Cascara	R. A.
Rhododendron albiflorum	Small Azalia	Rh. A.
Rosa Sp.	*Wild Rose	
Rubus parviflorus	X*Thimbleberry	R. P.
Rubus strigosus	*Red raspberry	R. S.
Rubus leucodermis	*Blackcap	R. Ls.
Rumex acidophilus	Sheep sorrel	R. Ac.
Salix	*Willow	Sx.
Sambucus glauca	Elderberry	S. G.
Shepherdia canadensis	Buffalo berry	S. C.
Sorbus scopulina	Mt. Ash	S. S.
Sorbus occidentalis	Mt. Ash	S. O.
Streptopus amplexifolius	Twisted stalk	S. A.
Spiraea lucida	*White spiraea	S. L.
Spiraea mensiesii	Rosy spiraea	S. M.
Symphoricarpus albus	Snowberry	S. A.
Tellima tenella	Tellima	T. T.
Tiarella unifoliata	X*Coolwort	T. U.
Trillium oratum	White Trillium	
Trillium petiolatum	Purple Trillium	
Urtica lyallii	Nettle	
Vaccinium membranaceus	*Huckleberry	V. M.
Vaccinium ovalifoium	*Huckleberry	V. O.
Veratrum viridi	False hellebore	V. V.
Veratrum Californicum		
Viburnum pauciflorus	Squashberry	V. P.
Vicia americana	Vetch	V. A.

Botanical determinations of this list were made by R. A. Kienholz and P. J. Kramer.

Latin Name	Popular Name	Symbol
Mitella sp.	*	
Moneses uniflora	Shin leaf	W. U.
Monotropa uniflora	Ghost flower	M. Un.
Mostia lineris	Small spring beauty	M. L.
Ophioglossum horridum	Devil's club	O. H.
Padbia virginiana	*Buckthorn	P. V.
Parnassia sarmentia	Bettleanake plantain	P. S.
Philadelphus lewisii	Mock orange (Syringa)	P. L.
Physocarpus pauciflorus	*Ninebark	P. P.
Potentilla glandulosa	Cinquefoil	P. G.
Prunella vulgaris	Heal all	
Prunus demissa	Choke cherry	P. D.
Prunus emarginata	Wild cherry	P. E.
Pteridium aquilinum	*Western Fern	
Pyrola rotundifolia	Shin leaf	P. R.
Ranunculus hybbylla	Buttercup	R. H.
Rhamnus purshiana	*Cascara	Rh. P.
Rhamnus alnifolia	Alder-leaved	R. A.
Rudbeckia albiflora	Small daisy	Rb. A.
Rosa sp.	*Wild rose	
Rubus parviflorus	Thimbleberry	R. P.
Rubus spectabilis	*Red raspberry	R. S.
Rubus leucodermis	*Blackcap	R. Le.
Rumex salicifolius	Sheep sorrel	R. Ac.
Salix	*Willow	Sx.
Sambucus glauca	Elderberry	S. G.
Shepherdia canadensis	Buffalo berry	S. C.
Sorbus sambucifolia	Mt. Ash	S. S.
Sorbus occidentalis	Mt. Ash	S. O.
Streptopus amplexifolius	*Twisted stalk	S. A.
Symphoricarpos albus	*White snowberry	S. A.
Tiarella unifoliata	Foam flower	T. U.
Trillium ovatum	White Trillium	
Trillium petiolatum	Purple Trillium	
Urtica lyallii	Nettle	
Vaccinium membranaceum	*Huckleberry	V. M.
Vaccinium ovalifolium	*Blueberry	V. O.
Veratrum viridi	False hellebore	V. V.
Veratrum Californicum		
Viburnum pauciflorum	Cranberry	V. P.
Vicia americana	Vetch	V. A.

Botanical Determination of this list were made by M. A. Clemens and P. J. Kramer.

RIBES SEED GERMINATION TESTS

1926-27

by

Ernest E. Hubert

Reference to literature (1) gives us the fact that most Ribes seeds require a resting period of from two to eight months or more, depending upon the species, before germination takes place. In order to test the resting period of R. viscosissimum, several fruits were collected near Harvard, Idaho, in 1926 and attempts made thoughout the winter to germinate them. Various methods were tried. Some of the seeds were exposed to the elements, others were kept in the laboratory, some were exposed for an hour and fifteen minutes in a drying oven at a beginning temperature of 70° C. and an end temperature of 90° C. From September 24, 1926 to April 22, 1927, no results were obtained. On April 25, germination commenced, but only in those groups of seeds that had been exposed to oven temperatures. A resting period of eight months for this collection of seeds is thus indicated, but a more important result is seen in the effect of temperature and the possible relation to the heat of forest fires.

A further study of germination is in progress, in which Ribes seeds collected from herbarium specimens are being tested. Most of the herbarium collections are five to six years old and have not been disinfected. To date, but two collections of seeds have shown any viability. Up to June 23, forty-five per cent of one collection have germinated and developed healthy seedlings. This collection of R. viscosissimum seeds was made on July 21, 1922 by F. A. Brown in Clearwater County, Idaho.

Within the same test period, 5 per cent of the seeds in another collection germinated. This collection of Ribes lacustre was made on July 22, 1922, by Goodding at Signal Peak, Washington. These seeds, therefore, remained viable for a period of 5 years stored under ordinary herbarium conditions.

The entire series of tests included 280 seeds from 16 different collections of two species of Ribes.

---

(1) Janczewski, Ed. de.
Monographie des Groseilliers.
Memoires de la Societe de Physique et d'Histoire Naturelle de Geneve, Vol. 35, Fas. 3, 199-516. October, 1907.

RIBES SEED GERMINATION TESTS
1926-27

by

Ernest E. Hubert

Reference to literature [1] gives us the fact that most Ribes seeds require a resting period of from two to eight months or more, depending upon the species, before germination takes place. In order to test the resting period of R. viscosissimum, several fruits were collected near Harvard, Idaho, in 1926 and attempts made throughout the winter to germinate them. Various methods were tried. Some of the seeds were exposed to the elements, others were kept in the laboratory, some were exposed for an hour and fifteen minutes in a drying oven at a beginning temperature of 70° C. and an end temperature of 90° C. From September 24, 1926 to April 25, 1927, no results were obtained. On April 25, germination commenced, but only in those groups of seeds that had been exposed to oven temperatures. A resting period of eight months for this collection of seeds is thus indicated, but a more important result is seen in the effect of temperature and the possible relation to the heat of forest fires.

A further study of germination is in progress, in which Ribes seeds collected from herbarium specimens are being tested. Most of the herbarium collections are five to six years old and have not been disturbed. To date, but two collections of seeds have shown any viability. Up to June 23, forty-five per cent of one collection have germinated and developed healthy seedlings. This collection of R. viscosissimum seeds was made on July 21, 1922 by T. A. Brown in Clearwater County, Idaho.

Within the same test period, 6 per cent of the seeds in another collection germinated. This collection of Ribes lacustre was made on July 22, 1922, by Goodding at Signal Peak, Washington. These seeds, therefore, remained viable for a period of 5 years stored under ordinary herbarium conditions.

The entire series of tests included 580 seeds from 18 different collections of two species of Ribes.

---

(1) Jaccard, P., de.
Recherches sur la Dissemination des Graines chez quelques Espèces de la Société de Physique et d'Histoire Naturelle de Geneve, Vol. 35, Fas. 2, 189-316. October, 1907.

Work for 1928.

The 1928 tests have already been started. These include about 1,500 seeds of five species of Ribes: R. viscosissimum, R. lacustre, R. nevadense, G. roezli, and G. inermis. Seeds of other species are being prepared for future tests. Twenty seeds are used for each unit test, and various sets of seeds are subjected to nine different conditions previous to testing for germination per cent. These conditions are: A--Heated 2 hours at 60° C. B--Heated 2 hours at 80° C. C--Heated 2 hours at 90° C. D--Exposed to outdoor zero weather for 2 weeks. E--Soaked in hot water at 100° F. for 2 hours. F--Soaked in concentrated sulphuric acid for 35 minutes. G--Not treated. H--Placed in carbon dioxide for 24 hours. I--Soaked in potassium chlorate solution for 25 minutes. J--Soaked in water, room temperature, for 24 hours. The seeds, after treatment, are placed in special germination trays for development.

These tests will be continued throughout 1928.

Leaf Area - Live Stem Studies

I. Definition of the Experiment

A systematic studied measurement of leaves and stems of each of the common native Ribes species, under each of the several sites and shade conditions common to that species, to determine the relation between a given unit measurement of live stem and the area of leaf surface. Each Ribes species is made a separate study.

II. Description of Basis Used in Making the Study

Ribes bushes were selected from every variation of site and of timber conditions, ultimately totaling a large number of bushes from every variable and from every size of bush. The goal of this study is that given a Ribes bush of a certain species, height and live stem, from a certain site under certain timber conditions, that bush can be authoritatively stated to have approximately a certain area of leaf surface.

III. Methods of Study

For the measurement of the western leaves, the Carruthers linear scale was first tried for the several species, but it was found to be entirely unsuited to the needs.

A circular scale was devised, which has been checked against 1,000 planimetered leaves of each species. The scales of this type for R. lacustre, R. viscosissimum and G. inermis are completed.

Some of the leaf measurement has been done in the field, while the leaves were green. Other bushes have been measured in the Office after the leaves had dried. Still other leaves have been measured both in the green and in the dried state. From this double measurement of some bushes in 1927, it has proven necessary to apply a correction factor to the measurements of all dried leaves, as a very marked shrinkage in area accompanies the drying of the leaves. The determination of the practical correction factor will be determined by further work along this line.

IV. Plan for Recording Data

The complete data for each Ribes bush is recorded on the following form, WF #18 BRC:

Leaf Area - Live Item Studies

I. Definition of the Treatment

A systematic studied measurement of leaves and items of each of the common native Ribes species, under each of the several sites and shade conditions common to that species, to determine the relation between a given unit measurement of live stem and the area of leaf surface. Each Ribes species is made a separate study.

II. Description of Data Used in Making the Study

Ribes bushes were selected from every variation of site and of timber conditions, ultimately totaling a large number of bushes from every variable and from every size of bush. The goal of this study is that given a Ribes bush of a certain species, height and live stem, from a certain site under certain timber conditions, that bush can be authoritatively stated to have approximately a certain area of leaf surface.

III. Methods of Study

For the measurement of the western leaves, the Carruthers linear scale was first tried for the several species, but it was found to be entirely unsuited to the needs.

A circular scale was devised, which has been checked against 1,000 plainmetered leaves of each species. The scales of this type for R. lacustre, R. viscosissimum and R. inermis are completed.

Some of the leaf measurement has been done in the field, while the leaves were green. Other bushes have been measured in the office after the leaves had dried. Still other leaves have been measured both in the green and in the dried state. From this double measurement of some bushes in 1927, it has proven necessary to apply a correction factor to the measurements of all dried leaves, as a very marked shrinkage in area accompanies the drying of the leaves. The determination of the practical correction factor will be determined by further work along this line.

IV. Plan for Recording Data

The complete data for each Ribes bush is recorded on the following form, WT #18 RSO:

WF #18 BEC.

ECOLOGY

Ribes No._____ Species_____ _____192__.

Location_____

_____

Shade_____

Associates_____

Age_____ Height_____ Area of Bush Spread_____

Live Stem_____ Dead Stem_____ New Growth_____

No. of Leaves_____ No. of Leaves Measured_____

Measured by_____ Recorded by_____

LEAF AREAS

V. Results to Date

Our preliminary studies regarding the shrinkage of individual leaves from the turgid to the dried condition gives the following results:

TABLE NO. 30

Shrinkage of Leaf-areas from Green to Dried State

Ribes Species	No. Leaves Measured	Average No. Sq. Inches per Leaf		Per Cent of Shrinkage
		Green	Dry	
R. lacustre	5	3.87	3.55	8.2
R. viscosis.	5	4.006	3.442	14.08
R. petiolare	5	5.262	4.595	13.36
G. inermis	5	1.132	.917	19.14
Average of 4 species	20	3.5675	3.151	11.67

The leaves of 30 R. lacustre bushes were measured when gathered in the field, were then dried in the press, and measured again in the dried condition. The leaves of 36 R. viscosissimum bushes were cared for in like manner. Records of both green and dry measurements were kept separate only by bushes, and not by individual leaves. The total leaf area per bush is the basis of comparison.

The results of these measurements are as follows:

TABLE NO. 31

Results of Measurement of Leaf-areas, Both Green and Dry of Entire Bushes

Ribes Species	No. Bushes as Basis	No. Leaves Measured		Average No. Sq.in. per leaf		Ave. Feet Live Stem	Ave. Feet Dead Stem	Ave. Feet New Growth	% of Shrinkage
		Per Bush	Total	Green	Dried				
R. lacustre	30	228.3	6,849	.977	.889	9.32	4.56	4.48	9.00
R. viscos.	37	122.4	4,530	2.2123	1.8516	15.36	6.996	6.051	16.08

V. Results to date

Our preliminary studies regarding the shrinkage of individual leaves from the turgid to the dried condition give the following results:

TABLE NO. 30

Shrinkage of Leaf-areas from Turgid to Dried State

Genus and species	No. Leaves measured	Average No. sq. inches per Leaf		Per Cent of Shrinkage
		Green	Dry	
1. Jacquinia	5	2.87	2.03	8.2
2. viscosa.	5	4.058	3.460	14.72
3. petiolaris	5	5.282	4.859	17.34
4. laurifolia	5	1.132	.977	13.13
Average of 4 species	20	3.837	3.331	13.47

The leaves of 20 J. laurifolia bushes were measured when gathered in the field, were then dried in the press, and measured again in the dried condition. The leaves of 20 J. viscosa bushes were cared for in like manner. Records of both green and dry measurements were kept separate only by bushes, and not by individual leaves. The total leaf area per bush is the basis of comparison.

The results of these measurements are as follows:

TABLE NO. 31

Results of Measurement of Leaf-areas, both Green and Dry of Entire Bushes

Species	Bushes measured	No. Leaves measured		Average No. sq.in.per Leaf		Ave. Leaf Area per Bush		Ave. Leaf Area per Bush		Per Cent of Shrinkage
	No.	For Each	Total	Green	Dry	Green	Dry	Green	Dry	
1. Jacquinia	20	2563.3	8,484	.377	.298	9.664	7.652	1.52	8.00	
2. viscosa.	37	1252.4	4,633	2.713	1.8578	1256.0	860.8	1.38	13.38	

TABLE NO. 32

Results of Leaf-area Measurement of Dry R. lacustre Leaves (1925-1927)

Number Bushes as Basis	Form of Bush	Dominant Plant Associates	Ave.Ht. of Bush in Feet	Ave.L.S. of Bush in Feet	Ave. No. Leaves per Bush	Total Leaf Area of Bush in Sq. Inches	Area of Ave.Leaf in Sq.In.	Sq.In.of Leaf per Ft. L.S.	Geographical Location of Bushes
					SUN - FORM BUSHES				
2	Sun	Cornus, Alnus	.9	6.2	136.	140.38	1.03	22.64	Lake Creek, Wallace, Idaho
33	"	Epilobium, Rubus Salix	1.6	17.3	237.6	259.4	1.09	14.99	Upper Priest R., Idaho
3	"	Salix	1.0	6.4	327.	101.3	.31	15.83	Near Priest Lake, Idaho
38	"	Epil., Rub., Sal.	1.54	15.8	239.3	240.8	1.01	15.24	All locations.
					SUN - SHADE FORM BUSHES				
6	Med.	Cornus, Salix, Acer	2.2	17.7	256.7	224.6	.88	12.69	Lake Creek, Wallace, Idaho
28	"	Rub., Sal., Epil.	1.9	29.2	334.1	489.3	1.41	17.10	Upper Priest R., Idaho
1	"	Rubus, Cornus	2.0	8.0	185.	116.8	.66	23.34	Near Harvard, Idaho
3	"	Cornus, Symphoricarpus, Pachistima	2.3	25.2	285.	313.6	1.10	12.44	Near Pierce, Idaho
7	"	Rub., Ac., Tril.	1.3	7.1	110.	106.8	.91	15.31	Near Priest Lake, Idaho
45	"	Rub. Sal. Epil. Acer, Corn.	1.82	23.9	298.6	382.6	1.28	16.01	All locations
					SHADE FORM BUSHES				
20	Shade	Ac., Alnus, Sal.	1.6	11.2	113.8	146.0	1.28	13.06	Lake Creek, Wallace, Idaho
38	"	Al. Cor. Rub. Sal.	1.7	18.0	152.6	219.8	1.44	12.21	Upper Priest River, Idaho
4	"	Rub. Corn. Salix	2.8	18.4	217.3	286.7	1.32	15.74	Near Harvard, Idaho
1	"	Pachys., Symph.	2.5	13.0	156.	161.7	1.04	12.44	Near Pierce, Idaho
11	"	Rub., Corn., Fern	1.6	13.6	243.7	220.1	.91	16.18	Near Priest Lake, Idaho
74	"	Al. Rub. Sal. Cor.	1.73	15.4	159.1	202.7	1.27	13.13	All locations
157	All	Rub. Epil. Sal. Corn., Alnus	1.71	17.96	218.5	263.47	1.21	14.67	Grand Total All Forms

TABLE NO. 32

Record of Land-area Measurement of Dry T. Aquatic Leaves (1915-1917)

Number Meadow de Imelle	Form of Bush	Locations of Plant Species	Ave.Ht. of Trees in Feet	Ave.D.B.H. of Bush in Feet	Ave. No. Leaves per Bush	Total Leaf Area of Bush in Sq.Inches	Area of Ave.Leaf in Sq.In.	Sq.In.of Leaf per Th. L.B.	Geographical Location of Swine
		SUB - [illegible]							
8	Sum	Quercus, Ilona	.4	0.2	128.	140.06	1.09	32.84	Lake Creek, Hillsboro, Idaho
23	"	Phillydrian, Prunus Salix	1.5	17.3	[illegible]372.6	[illegible]38.4	1.09	16.35	Upper Priest R., Idaho
4	"	Salix	1.0	8.4	[illegible]824.	101.3	.71	32.67	Upper Priest Lake, Idaho
34	"	Salix, Populus, Pinus	1.6a	1.6a	[illegible]276.	[illegible]40.8	1.20	34.28	Mill Creek, [illegible]
		SUB - S [illegible]							
6	Med.	Quercus, Salix, Laur	8.4	17.7	[illegible]42.7	[illegible]4.8	.34	13.85	Lake Creek, Hillsboro, Idaho
25	"	Sal., Sal., Sal.	1.3	8.4	[illegible]24.1	158.6	1.41	17.13	Upper Priest R., Idaho
1	"	Thuja, Quercus	1.7	5.0	[illegible]65.	158.6	.85	22.34	Four Lakeyard, Idaho
3	"	Quercus, Pinus, Rhododendron, Populations	1.7	10.2	[illegible]25.	213.8	1.10	12.44	Deer Flats, Idaho
7	"	Sal., Le., Tril.	1.3	7.3	[illegible]8.	[illegible]70.5	.31	15.31	Deer Priest Lake, Idaho
45	"	Sal., Sal., Tril., Acer, Quer.	1.0	22.2	[illegible]4.	385.8	1.29	18.01	All Locations
		SWAMP TYPE GROUP							
20	Bush	Le., Quer., Sal.	1.6	11.2	[illegible]4.	[illegible]4.	1.16	13.05	Lake Creek, Hillsboro, Idaho
24	"	Sal., Quer., Sal.	1.7	12.1	[illegible].	[illegible].	1.04	13.61	Upper Priest River, Idaho
4	"	Sal., Quer., Salix	1.3	11.4	[illegible]7.	[illegible]7.	1.04	13.74	Deer Prairie, Idaho
1	"	Quercus, Pinus,	2.3	15.0	[illegible].	[illegible].	1.04	12.44	Deer Fierce, Idaho
11	"	Sal., Pinus, Pop.	1.4	7.4	[illegible].	[illegible].	.71	14.18	Deer Priest Lake, Idaho
74	"	Sal., Sal., Cor.	1.73	15.4	[illegible].	[illegible].	1.47	13.13	All Locations
177	33	Sal., Sal., Sal., Cor., Quer.	1.74	17.70	[illegible]13.6	[illegible].	1.31	14.47	Mixed Total All Types

TABLE NO. 33

Results of Leaf-area Measurement of Dry R. viscosissimum Leaves (1925-1927)

Number Bushes as Basis	Form of Bush	Dominant Plant Associates	Ave.Ht. of Bush in Feet	Ave.L.S. of Bush in Feet	Ave. No. Leaves per Bush	Total Leaf Area of Bush in Sq.Inches	Area of Ave.Leaf in Sq.In.	Sq.In.of Leaf per Ft. L.S.	Geographical Location of Bushes
					SUN - FORM BUSHES				
4	Sun	Cornus, Rubus	3.9	33.4	359.8	729.7	2.02	21.87	Near Harvard, Idaho
1	"	Fragaria,Salix, Pachystima	1.3	10.0	95.	157.6	1.66	15.76	Bovill, Idaho
27	"	Salix,Pach.,Epil.	3.03	16.50	147.6	327.5	2.21	19.85	Upper Priest River
32		Sal.,Pach.,Rub.	3.1	18.4	170.94	372.45	2.18	20.25	Average of all
					SUN - SHADE FORM				
4		Grass, Rubus	3.5	37.5	227.8	550.26	2.42	14.67	Near Harvard, Idaho
1		Sal.,Rub.,Pachys.	4.0	74.0	732.	1,102.74	1.51	14.90	Bovill, Idaho
24		Rub.,Pach.,Salix	2.6	15.4	77.9	190.96	2.45	12.42	Upper Priest River
29		Rub.,Pach.,Salix	2.8	20.44	121.14	271.95	2.24	13.30	Average of all
					SHADE FORM				
10		Rub.,Coptis,Sal.	2.9	8.8	72.5	135.50	1.87	15.47	Near Harvard, Idaho
16		Coptis,Rosa,Lin.	1.1	3.5	21.5	31.52	1.47	9.05	Kaniksu
1		Pach.,Copt.,Corn.	3.0	36.0	157	337.08	2.15	9.36	Pierce, Idaho
29		Pach.,Vaccin.Rub.	2.1	9.3	23.5	79.74	3.39	8.54	Upper Priest River
56		Pach.,Coptis,Rosa	2.5	8.0	46.3	80.51	2.36	10.01	Average of all
117		Pach.,42;Rub.33; Salix,32.	2.7	9.65	98.94	207.80	2.10	16.26	Grand average

TABLE NO. 32

Results of Leaf-area Measurement of Pyr. malifolium Leaves (1938-1939)

Number Series on Twig	Form of Rank	Location of Rank on Plant	Ave. No. of Ranks in Plot	Ave. L.A. of Rank in Sq.Ft.	Ave. No. Leaves per Rank	Total Leaf Area of Rank in Sq.Inches	Area of Ave. Leaf in Sq.Inches	Sq. In. of Leaf per Sq. Ft.	Geographical Location of Series
				1938 - Typical Drought					
4	Sing.	Extreme Tip	1.4	83.4	139.3	729.7	5.32	71.57	Near Harvard, Idaho
7	"	Terminals, Main Axis, Lengthening	1.3	70.0	83.	171.6	1.88	19.71	Devil's Tables
27	"	Main Axis, Tip	3.33	13.71	142.3	327.8	2.31	19.85	Upper Priest River
32		Main, Trunk, Main	3.3	14.4	1772.44	814.61	2.11	20.14	Average of all
					1939 - Typical Year				
4		Extreme Tip	1.3	72.5	267.3	1021.71	3.81	14.17	Near Harvard, Idaho
1		Main, Main Axis, Terminals	4.1	74.0	1256.	1,107.24	1.71	14.41	Devil's Tables
14		Main, Main, Terminals	3.8	11.4	71.4	141.14	1.49	12.48	Upper Priest River
17		Main, Trunk, Main	3.1	67.11	181.1a	517.24	2.84	13.12	Average of all
					Spring 1940				
27		Main, Terminals, Main	4.1	0.1	12.4	1(8.(1	).(9	14.47	Near Harvard, Idaho
1		Terminals, Main Axis	1.1	.1	11.6	11.41	1.47	4.08	Tensions
1		Main, Main, Terminals	3.1	1.7	1.7	1.7	1.13	4.58	Flatrock, Idaho
89		Main, Lateral, Main	1.)	4.1	11.8	73.74	6.19	5.94	Upper Priest River
96		Main, Main Axis, Main	4.1	3.0	84.1	59.81	1.36	10.01	Average of all
117		Main, Main, Main	4.1	1.19	41.14	247.01	3.10	18.13	Grand average
		Main Axis, Tip							

The measurement work of all leaves on hand has just been completed at the time this report is written, and no analysis of the results is here attempted.

Besides the preceding data, the measurements are complete for Ribes as follows:

57	R. viscosissimum	bushes	(measured only when green).
26	R. lacustre	"	(" " " ").
33	G. inermis	"	(" " " ").
3	R. viscosissimum	"	(measured only when dry).
1	R. lacustre	"	(" " " ").

129 R. petiolare leaves (planimetered for making of circular scale).

In so far as the results have merely been tabulated and no analysis has even been started, no comments on the results will be made at this time.

VI. Summary

No summary of this work can be made at this time.



W.643. Dense mature white pine in left foreground, dense reproduction white pine in far center, open reproduction in right foreground, Deception Creek, Coeur d'Alene National Forest.



W. 699. Open mature type, Cascade Creek.

EXPERIMENTAL RIBES ERADICATION IN IDAHO

by

C. C. Strong - Assistant Forester

Introduction

In accordance with the general plan set forth in previous reports the scene of eradication of the wild hosts of white pine blister rust in 1927 shifted to the Coeur d'Alene National Forest. Sampling of as many general areas as possible during the principal experimental stage of control work is imperative. It is true that conditions affecting Ribes eradication vary greatly on the various white pine areas of the Inland Empire. To confine experimental eradication to one of these general areas would result in securing accurate bases for application of local control in that particular region but would give no satisfactory basis for application in other regions where conditions may differ greatly. It is essential that a basis for application in a general way be secured.

The Kaniksu National Forest in north Idaho, where handpulling activities have been centered largely in the past, was so severely burned over by fires during the 1926 conflagration that it would have been impractical to attempt eradication so soon thereafter. Areas not burned over in 1926 or logged over recently were broken up to such an extent that no large bodies of white pine reproduction or timber type were available for a satisfactory experimental area. The above mentioned conditions were alone sufficient cause for abandoning eradication on the Kaniksu National Forest for the 1927 season and possibly for a longer period.

Some scouting was done in the fall of 1926 when the area centering around Prichard, in the eastern section of the Coeur d'Alene National Forest, was examined. This region was fairly satisfactory but it was felt that there were other areas where the operation could be better centralized and where white pine type represented a still greater percentage of the total forested area.

During the winter of 1926 - 1927 a thorough analysis of data secured by reconnaissance crews in the past was made. Several areas were found having 10,000 to 15,000 acres of almost solid white pine type. However, most of these did not represent a sufficient amount of the younger age classes. Furthermore, some of them are not now readily accessible but probably will be in a few years with development of roads and trails.

To insure against overlooking areas where reconnaissance crews had not yet worked a visit was made to the headquarters of the Pend Oreille, Clearwater, Coeur d'Alene and St. Joe National Forests. At each forest headquarters the supervisor or deputies or both were consulted. Information was secured relative to timber types, age classes, forest improvements

[illegible] - Application in Idaho

by

C. C. Strong - Assistant Forester

Introduction

In accordance with the general plan set forth in previous reports the scene of eradication of the wild hosts of white pine blister rust in 1927 shifted to the Coeur d'Alene National Forest. Sampling of as many general areas as possible during the principal experimental stage of control work is imperative. It is true that conditions affecting ribes eradication vary greatly on the various white pine areas of the Inland Empire. To confine experimental eradication to one of these general areas would result in securing accurate bases for application of local control in that particular region but would give no satisfactory basis for application in other regions where conditions may differ greatly. It is essential that a basis for application in a general way be secured.

The Kaniksu National Forest in north Idaho, where handpulling activities have been centered largely in the past, was so severely burned over by fires during the 1926 conflagration that it would have been impractical to attempt eradication so soon thereafter. Areas not burned over in 1926 or logged over recently were broken up to such an extent that no large bodies of white pine reproduction or timber type were available for a satisfactory experimental area. The above mentioned conditions were alone sufficient cause for abandoning eradication on the Kaniksu National Forest for the 1927 season and possibly for a longer period.

Some scouting was done in the fall of 1926 when the area comprising around Priest, in the eastern section of the Coeur d'Alene National Forest, was examined. This region was fairly satisfactory but it was felt that there were other areas where the operation could be better centralized and where white pine type represented a still greater percentage of the total forested area.

During the winter of 1926 - 1927 a thorough analysis of data secured by reconnaissance crews in the past was made. Several areas were found having 10,000 to 15,000 acres of almost solid white pine type. However, most of these did not represent a sufficient amount of the commercial age classes. Furthermore, some of them are not now readily accessible but probably will be in a few years with development of roads and trails.

[illegible] inspection against overlooking areas where reconnaissance crews had not yet worked a visit was made to the headquarters of the Pend Oreille Clearwater, Coeur d'Alene and St. Joe National Forests. At each forest headquarters the supervisor or deputies or both were consulted. Information was secured relative to timber types, age classes, forest improvement

(roads, trails, telephone lines, etc.), cutting and management plans and burned and cutover areas. A large amount of useful information was accumulated and put into shape for future use whenever work is done on any of the areas in question.

As a result of the investigations made the area centering around the Honeysuckle Ranger Station on the Coeur d'Alene National Forest was tentatively chosen for the 1927 experiment. As early in the spring as was possible the area was extensively examined. Much of the region was still heavily blanketed with snow and Ribes conditions could be observed only on the lower elevations. The preliminary survey showed the area to be more desirable than had been anticipated. Plans were immediately begun for opening up work as soon as the road over the pass into Honeysuckle was open.

Previous to 1927 (with the exception of 1924) the checking and methods work was not under the general supervision of the eradication project leader. In order to make the checking and methods findings more quickly and readily available to the eradication crews it was decided to place both projects under the general supervision of the eradication project leader.

I. Purpose

In general the purposes of the 1927 work in eradication of the wild hosts of white pine blister rust were:

1. Perfection of existing methods of hand eradication.
2. Discovery and development of better methods of hand eradication.
3. Development of checking and efficiency methods.
4. Development of a better pre-eradication method.
5. Development of personnel for future work.

II. Location and Description of Area

The area chosen for the 1927 field work centers around the Honeysuckle Ranger Station on the Little North Fork of the Coeur d'Alene River, Coeur d'Alene National Forest, Idaho. Most of the area lies in T. 51 N., R. 1 W., of the Boise Principal Meridian. In addition the work extended into T. 52 N., R 1 W., on the north; 51 N., R 2 W., on the west and T. 50 N., R 1 W., on the south.

The entire area drains into the Little North Fork of the Coeur d'Alene River. Subsidiary drainages covered were Skookum, Deception Burnt Cabin, Lone Cabin and Cascade Creeks. Due to the extended rainy period near the end of the season certain small areas designated on the general maps on file in the Washington and Spokane offices were not completed.

Almost the whole area covered is classified as white pine type although only limited portions are classed as pure. In general the area

(roads, trails, tele hone lines, etc.), cutting and management plans and
mapped and cutover areas. A large amount of useful information was
accumulated and put into shape for future use whenever work is done on
any of the areas in question.

As a result of the investigations made the area centering around the Honeysuckle Ranger Station on the Coeur d'Alene National Forest was tentatively chosen for the 1927 experiment. As early in the spring as was possible the area was extensively examined. Much of the region was still heavily blanketed with snow and Ribes conditions could be observed only on the lower elevations. The preliminary survey showed the area to be more desirable than had been anticipated. Plans were tentatively began for opening up work as soon as the road over the pass into Honeysuckle was open.

Previous to 1927 (with the exception of 1924) the checking and methods work was not under the general supervision of the eradication project leader. In order to make the checking and methods findings more quickly and readily available to the eradication crews it was decided to place both projects under the general supervision of the eradication project leader.

I. Purpose

In general the purposes of the 1927 work in eradication of the white boots of white pine blister rust were:

1. Perfection of existing methods of hand eradication.
2. Discovery and development of better methods of hand eradication.
3. Development of checking and efficiency methods.
4. Development of a better pre-eradication method.
5. Development of personnel for future work.

II. Location and Description of Area

The area chosen for the 1927 field work centers around the Honeysuckle Ranger Station on the Little North Fork of the Coeur d'Alene River, Coeur d'Alene National Forest, Idaho. Most of the area lies in T. 51 N., R. 1 W., of the Boise Principal Meridian. In addition the work extended into T. 52 N., R. 1 W., on the north; 51 N., R. 2 W., on the west and T. 50 N., R. 1 W., on the south.

The entire area drains into the Little North Fork of the Coeur d'Alene River. Subsidiary drainages covered were Slocum, Deception, Burnt Cabin, Long Cabin and Cascade Creeks. Due to the extended rainy period near the end of the season certain small areas designated on the general maps on file in the Washington and [illegible] offices were not completed.

Almost the whole area covered is classified as white pine type although only limited portions are classed as pure. In general the area

is heavily timbered with reproduction, pole or mature stands. All age classes, eradication types and conditions prevail. Ribes of three species are represented. Ribes lacustre is heavily and generally distributed. Ribes viscosissimum is present but heavily distributed on only limited areas. Grossularia inermis is very heavily distributed on flats and swampy areas along the Little North Fork and on other meandering streams.

Heavy snowfall and an abundance of rainfall throughout most of the year results in heavy brush as well as timber. White pine reproduces very satisfactorily after fires and cuttings on the entire area. However, the district has been well protected by the Forest Service and private operators with the result that only small fires have occurred.

The elevation of the area on which work was done varies from 3000 to 5300 feet. Steep slopes characterize the region.

An excellent truck road connects Honeysuckle Ranger Station with the City of Coeur d'Alene about 30 miles away. Good trails radiate from Honeysuckle to all parts of the area. In general the area was readily accessible by truck and pack string.

General improvements, aside from roads and trails, include logging camps and telephone lines. Application of management had a tremendous effect on eradication of Ribes. On the other hand logging operations and burning have greatly increased the Ribes population on acreas cut over.

III. Methods and Equipment

Throughout the field season crew organization was generally similar to that in other seasons with the exception of size. Large crews have, in the past, been a constant source of much lost time. Small crews have been used to some extent. When paper was used as trail marking the man laying as well as the man following trail could take only one-half the width other men in the crew could cover. This made it impractical to use small crews. With the use of string the man following trail can cover a full strip and the man laying string, not being occupied with snuffling of paper is able to cover more than a half strip. Due to this lessening of the time laying and following trail there is very little time lost when string is used and small crews can be used to advantage. Consequently the 1927 season saw intensive experimentation with smaller crews both on scout and regular crew work. The results showed the value of the experiment as brought out later in this report.

In general four types of crews were used. Areas of more or less dense pole and mature timber were worked largely by intensive and extensive scout crews made up of old experienced men and promising new men. Streams, reproduction and other areas requiring close working were covered by regular crew men under the supervision of an experienced foreman. The regular crews worked in intensive or extensive formation depending on the distribution of Ribes and the difficulty factor.

The elevation of the area on which work was done varies from 3000 to 5500 feet. Steep slopes characterize the region.

An excellent truck road connects Moneyauskie Ranger Station with the City of Coeur d'Alene about 30 miles away. Good trails radiate from Moneyauskie to all parts of the area. In general the area was readily accessible by truck and pack string.

General improvements, aside from roads and trails, include logging camps and telephone lines. Application of management had a tremendous effect on eradication of Ribes. On the other hand logging operations and burning have greatly increased the Ribes population on acreage cut over.

III. Methods and Equipment

Throughout the field season crew organization was generally similar to that in other seasons with the exception of size. Large crews have, in the past, been a constant source of much lost time. Small crews have been used to some extent. When paper was used as trail marking the man laying as well as the man following trail could take only one-half the width other men in the crew could cover. This made it impractical to use small crews. With the use of string the man following trail can cover a full strip and the man laying string, not being occupied with shuffling of paper is able to cover more than a half strip. Due to this lessening of the time laying and following trail there is very little time lost when string is used and small crews can be used to advantage. Consequently the 1927 season saw intensive experimentation with smaller crews both on scout and regular crew work. The results showed the value of the experiment as brought out later in this report.

In general four types of crews were used. Areas of more or less dense pole and mature timber were worked largely by intensive and extensive scout crews made up of old experienced men and promising new men. Streams, reproduction and other areas requiring close marking were covered by regular crew men under the supervision of an experienced foreman. The regular crews worked in intensive or extensive formation depending on the distribution of Ribes and the difficulty factor.

is heavily timbered with reproduction, pole or mature stands. All age classes, eradication types and conditions prevail. Ribes of three species are represented. Ribes lacustre is heavily and generally distributed. Ribes viscosissimum is present but heavily distributed on only limited areas. Grossularia inermis is very heavily distributed on flats and swampy areas along the Little North Fork and on other meandering streams.

Heavy snowfall and an abundance of rainfall throughout most of the year results in heavy brush as well as timber. White pine reproduces very satisfactorily after fires and cuttings on the entire area. However, the district has been well protected by the forest service and private operators with the result that only small fires have occurred.



W.606. Pack string used in 1927.



W. 608-A. Truck loaded with supplies for camps. 1927.

606

608

The foreman on scout crews works in the center of the line while the foreman on regular crews checks behind the crew.

The experiments carried on in 1926 using string as trail marking proved that the use of string was better and more economical than the use of paper, the economy resulting from lessening of time lost searching for paper trails. Accordingly all crews used string in 1927. String boxes similar to the one shown in the 1926 report on methods was first used. This proved fairly satisfactory but was later replaced by a round straight stick fitted to the cone on one end and sharpened on the other so that it could be stuck in the ground when the trail layer was called out of line to pull bushes.

The tools used consisted of the army trench pick for general use and the miner's pick for special use where bushes were rooted in heavy rock.

The Winton Lumber Company, operating in the Honeysuckle region, very kindly offered the use of a warehouse and one of their logging camps which offer was accepted.

All men, supplies and equipment were transported to the central warehouse at Honeysuckle by means of the G. M. C. truck purchased for that purpose just before the season began.

A pack string consisting of 8 mules and a saddle horse was rented from Stonebraker Brothers at Orofino, Idaho for use during the season. All transporting of supplies and equipment from the central warehouse to the camps off the truck road was done by pack animals.

Previous experiments showed that a camp unit of about 25 men was most satisfactory. Four of the units employed in 1927 were based on this number while the Camp 5 unit was smaller and made up largely of experienced men used as scouts. Camp 5 was a special unit experimenting on scouting methods for comparison with more intense work being done by regular methods in other camps. Each camp had a competent supervisor who was responsible to the general supervisor of the eradication project.

Checking work was done by 6 men one of whom, P. S. Simcoe, was the head of the unit and under the general supervision of the eradication project leader. In general it was planned to check 2% of the regular crew work and from ½ to 1% of the scout work.

Methods work, instead of being done by special crews, as was generally the case in past work, was done by the check crew and by the unit supervisors as a part of their regular work. By use of this system the methods work was more closely tied up with actual eradication work.

eradication work.

This system the methods work was more closely tied up with actual by the unit supervisors as a part of their regular work. By use of was generally the case in past work, was done by the check crew and methods work, instead of being done by special crews, as

the regular crew work and from ½ to 1% of the scout work.

eradication project leader. In general it was planned to check 5% of was the head of the unit and under the general supervision of the Checking work was done by 8 men one of whom, H. B. Simcoe,

the eradication project.

competent supervisor who was responsible to the general supervisor of work being done by regular methods in other camps. When camp had a experimenting on scouting methods for comparison with more intense largely of experienced men used as scouts. Camp 5 was a special unit based on this number while the Camp 5 unit was smaller and made up men was most satisfactory. Four of the units employed in 1927 were

Previous experiments showed that a camp unit of about 25

animals.

central warehouse to the camps off the truck road was done by pack the season. All transporting of supplies and equipment from the rented from Stonebraker Brothers at Orofino, Idaho for use during

A pack string consisting of 8 mules and a saddle horse was

chased for that purpose just before the season began.

central warehouse at Honeysuckle by means of the G. M. C. truck pur- All men, supplies and equipment were transported to the

logging camps which offer was accepted.

tion, very kindly offered the use of a warehouse and one of their The Winton Lumber Company, operating in the Honeysuckle re-

heavy rock.

use and the miner's pick for specified use where breaks were rooted in The tools used consisted of the army trench pick for general

when the trail layer was called out of line to pull breaks.

end and sharpened on the other so that it could be stuck in the ground later replaced by a round straight stick fitted to the cone on one on methods was first used. This proved fairly satisfactory but was in 1927. String boxes similar to the one shown in the 1926 report lost something for paper trails. Accordingly all crews used string than the use of paper, the economy resulting from lessening of time marking proved that the use of string was better and more economical

The experiments carried on in 1926 using string as trail

foreman on regular crews checks behind the crew.

The foreman on scout crews works in the center of the line while the

Pre-eradication, that work done ahead of actual eradication for the purpose of collecting advance information on the area, was begun in 1927. Two general methods were used. They will be described in detail later.

IV. Work Performed and Results

A. Progress

The season of 1927 was unique in one respect. It was the first season since eradication was attempted on a large scale that crews were able to go almost the entire season without being called upon for duty as fire fighters. Only in a few instances were men needed for fire fighting in 1927. On these occasions only a few men were needed and these for no more than a day at a time. The result was most noticeable in acreage covered and total Ribes pulled. Further, the difficulty of keeping men on the job due to hardships met on fire duty was not encountered. Table 1 shows the total progress on hand pulling for the season.



Pre-emption, that work done ahead of actual organization for the purpose of collecting advance information on the area, was begun in 1917. Two general methods were used. They will be described in detail later.

IV. Work Carried and Results

A. Stumpage

The season of 1917 was unique in one respect. It was the first season since organization was attempted on a large scale in which crews were able to go almost the entire season without being called upon for duty as fire fighters. Only in a few instances were men needed for fire fighting in 1917. On these occasions only a few men were needed and these for no more than a day at a time. The result was most noticeable in acreage covered and total miles pulled. Further, the difficulty of keeping men on the job due to burdensome wet on fire duty was not encountered. Table I shows the total progress in hand pulling for the season.

TABLE NO. 1

Summary of Eradication by Type - 1927

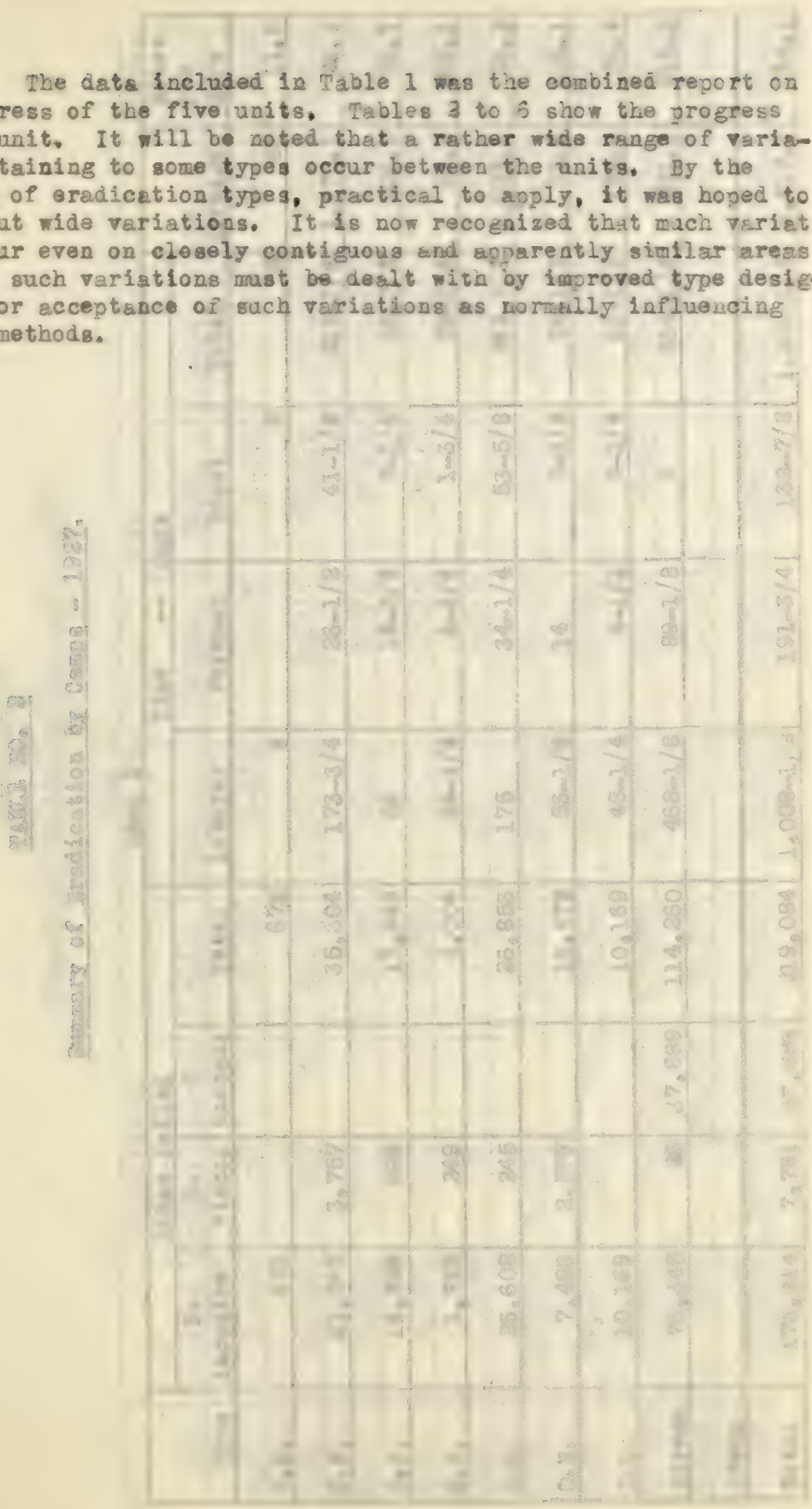
Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	S. inermis	Total	Laborer	Foreman	Scout	Total		
D.M.	43,408	2,899	8	45,315	61-1/2	67-1/24	137-1/24	265-7/12	2,269.1	20.4
O.M.	286,057	33,590	248	319,895	619-1/16	263-3/4	398-1/8	1,280-13/16	6,357.5	50.3
D.P.	36,073	17,932	23	54,028	82-7/8	36-7/8	48-1/2	168-1/4	1,320.3	40.9
O.P.	27,514	4,587		32,101	71-7/8	28-7/24	45-1/2	145-2/3	1,177.0	27.3
D.R.	36,606	554		37,160	190-1/2	43-5/24	61-7/8	295-7/12	1,309.4	34.2
O.R.	120,230	16,638		136,968	357-3/8	119	66-1/4	542-5/8	618.3	205.0
Cut-over	593,473	243,903	2,825	840,201	978-1/4	315-5/12	221-7/8	1,515-13/24	2,482.5	338.4
Stream	434,080	2,299	117,016	553,385	1,531-1/4	380-1/4	96-1/8	2,007-5/8	987.9	560.2
Swamp	845		47,735	48,580	78-3/8	21-7/8		100-1/4	15.5	3,134.8
Total	1,578,286	322,392	167,855	2,068,533	3,971-1/16	1,275-17/24	1,075-7/24	6,322-1/16	16,487.5	126

TABLE NO. 1

SUMMARY OF PRODUCTION BY TYPE - 1952

Type	Number	Value	Average Price	Number	Value	Average Price	Number	Value	Average Price
Total	1,278,288	$1,278,288,000	$1.00	1,278,288	$1,278,288,000	$1.00	1,278,288	$1,278,288,000	$1.00
Type 1	1,278,288	$1,278,288,000	$1.00	1,278,288	$1,278,288,000	$1.00	1,278,288	$1,278,288,000	$1.00
Type 2									

The data included in Table 1 was the combined report on the progress of the five units. Tables 2 to 6 show the progress of each unit. It will be noted that a rather wide range of variation pertaining to some types occur between the units. By the building of eradication types, practical to apply, it was hoped to smooth out wide variations. It is now recognized that much variation does occur even on closely contiguous and apparently similar areas and that such variations must be dealt with by improved type designations or acceptance of such variations as normally influencing present methods.



The data included in Table I was the remaining report on the progress of the five units. Tables 2 to 5 show the progress of each unit. It will be noted that a rather wide range of variation pertaining to some types occur between the units. By the building of evaluation types, practical to apply, it was hoped to smooth out wide variations. It is now recognized that such variation does occur even on closely contiguous and apparently similar areas and that such variations must be dealt with by improved type designations or recognizance of such variations as normally influencing present methods.

TABLE NO. 2

Summary of Eradication by Camps - 1927.

Camp 1

Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	G inermis	Total	Laborer	Foreman	Scout	Total		
D.M.	673			673	3		5	8	61	11.0
C.W.	31,547	3,757		35,304	173-3/4	26-1/2	41-1/8	238-3/8	1,478.1	23.9
C.F.	16,824	525		17,349	63	18-5/8	7-1/4	88-7/8	306.0	56.7
C.F.	3,755	249		4,004	24-1/4	3-3/4	1-3/4	29-3/4	39.2	102.1
D.F.	26,608	245		26,853	175	34-1/4	53-5/8	262-7/8	1,035.1	26.2
C.R.	7,493	2,979		10,472	53-1/8	14	7-3/8	74-1/2	92.6	113.1
C.C.	10,169			10,169	48-1/4	8-1/2	9-3/4	66-1/2	194.0	52.4
Stream	76,345	26	37,889	114,260	468-1/8	89-1/8	7	564-1/4	221.3	516.3
Swamp										
Total	173,414	7,781	37,889	219,084	1,008-1/2	191-3/4	132-7/8	1,333-1/8	3,417.3	64.1

TABLE NO. 9

Summary of Syndications by Cameo - 1927.

Cameo I

Type	Lucrative	Viscous	Lubricating	Total	Labor Unit	Time -- Days Interest	Short	Total	Cameo Per Cent
U.S.	872			872			8	8	11.0
C.E.	41,547	3,777		45,324	17d-1/4	9d-1/8	11-1/8	37d-1/8	84.1
C.P.	19,894	825		20,719	6d	10-1/8	7-1/4	23-7/8	91.7
C.L.	4,765	381		5,146	5d-1/4	1-1/4	3-1/4	9d-1/8	108.1
C.A.	28,850	345		29,195	17d	4d-1/8	5d-1/8	26d-7/8	98.4
C.J.	7,413	1,078		10,491	9d-1/8	1d	7-1/4	24-1/8	116.1
C.C.	10,149			10,149	4d-1/4	8-1/4	1-1/4	13-1/8	96.4
Stream	72,345	36	67,889	140,280	46d-1/8	8d-1/8	7	61d-1/4	84.4
Total	178,414	7,781	67,889	254,084	1,000-1/2	121-1/4	122-7/8	1,000-1/8	94.1

TABLE NO. 3

Summary of Eradication by Camps - 1927.

Camp 2.

Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	G. inermis	Total	Laborer	Foreman	Scout	Total		
D.M.	3,943	5	8	3,956	6-3/8	6-1/8	6-1/2	19	96.6	40.9
O.M.	61,992	234	41	62,267	52-1/2	59-5/8	54-5/8	166-3/4	434.9	146.6
D.P.	2,549	1		2,550	8-1/4	4-1/8	2-3/4	15-1/8	81.3	31.4
O.P.	3,590			3,590	9	3-1/4	3-1/2	15-3/4	16.5	217.6
D.R.	4,337	2		4,339	13	6-3/8	2	21-3/8	39.3	110.4
O.R.	102,050	1,117		103,167	267-7/8	83-1/4	15-1/2	366-5/8	440.2	234.4
C.C.	59,319	375	568	60,262	88-3/8	49-7/8	21-1/4	159-1/2	242.7	248.3
Stream	81,839	50	25,530	107,419	268-3/4	78-3/8	4-3/4	351-7/8	115.1	933.3
Swamp	845		47,735	48,580	79-3/8	21-7/8		100-1/4	15.5	3,134.2
Total	320,464	1,784	73,882	396,130	792-1/2	312-7/8	110-7/8	1,216-1/4	1,472.1	269.0

TABLE NO. 3

Summary of Precipitation by Counts - 1927.

(Page 3)

Type	Locality	Type Pulled		Type -- 1928					
		No. Pulled	No. Imperials	Total	Laborer	Foreman	Count	Total	Difference
D.M.	[illegible]	8	5	[illegible]	8-1/8	8-1/8	6-1/8	18	[illegible]
D.M.	[illegible]	41	24	[illegible]	52-1/8	84-4/8	[illegible]	[illegible]	[illegible]
D.M.	[illegible]	1		[illegible]	8-1/4	4-1/8	2-1/4	[illegible]	[illegible]
D.M.	[illegible]			[illegible]	9	4-1/8	4-1/8	[illegible]	[illegible]
D.M.	[illegible]	3		[illegible]	18	8-3/8	8	[illegible]	[illegible]
D.M.	[illegible]	[illegible]		[illegible]	[illegible]	84-7/8	[illegible]	[illegible]	[illegible]
D.M.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE NO. 4

Summary of Eradication by Camps - 1927

Camp 3

Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	G. inermis	Total	Laborer	Foreman	Scout	Total		
D.M.	8,158	2,062		10,220	25-5/8	11-1/2	20-3/4	57-7/8	465.0	22.0
C.M.	42,167	23,148	82	65,397	140-1/4	46-3/8	81-5/8	268-1/4	1,287.0	50.8
D.P.	11,350	17,406		28,756	4-1/2	6-5/8	25-1/8	36-1/4	398.0	72.3
C.P.	13,158	4,222		17,380	23-5/8	9-3/4	18-5/8	52	157.0	110.7
D.R.	324			324	2-1/2	1/2		3	7.0	46.3
C.R.	5,744	4,311		10,055	33-1/8	11	15-7/8	60	63.0	159.6
C.C.	310,359	239,486	106	549,951	503	128-1/4	81	712-1/4	1,305.0	422.1
Stream	63,093	1,837	24,571	89,501	257-5/8	65-5/8	22-3/4	346	180.0	497.2
Swamp										
Total	454,353	292,472	24,759	771,584	990-1/4	279-5/8	265-3/4	1,535-5/8	3,860.0	199.9

Tableau [illegible]

[illegible] – [illegible]

Camp 3

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE NO. 5

Summary of Eradication by Camps - 1927.

Camp 4

Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	G. inermis	Total	Laborer	Foreman	Scout	Total		
D.M.	2,930	3		2,933	9-1/2	7-7/8	9-1/4	26-5/8	335.5	23.0
O.M.	143,674	5,736	125	149,535	252-9/16	116-1/4	201-3/4	580-9/16	2,836.5	52.7
D.P.	16			16	1/8	1/4	3/8	3/4	50.0	0.3
O.P.	659	5		664	7-1/2	3-1/8	3-7/8	14-1/2	198.3	3.3
D.R.										
O.R.	4,943	8,231		13,174	3-1/4	10-3/4	27-1/2	41-1/2	22.5	585.5
C.O.	67,234	2,830	377	70,441	206-3/8	58	30-1/4	294-5/8	285.5	246.8
Stream	108,768	3	16,464	130,235	304-3/8	69-5/8	17-1/2	391-1/2	144.9	329.9
Swamp										
Total	323,224	16,808	16,956	356,988	783-11/16	275-7/8	290-1/2	1,350-1/16	3,873.2	92.2

Cap 4

| | | |

TABLE NO. 6

Summary of Eradication by Camps - 1927

Camp 5

Type	Ribes Pulled				Time -- Days				Acreage	Ribes Per Acre
	R. lacustre	R. visco.	G. inermis	Total	Laborer	Foreman	Scout	Total		
D.W.	27,704	829	[illegible]	28,533	17	41-13/24	95-13/24	154-1/13	1,311.0	21.8
C.W.	6,677	715		7,392		8	19	27	331.0	22.3
D.P.	5,334		23	5,357	7	7-1/4	13	27-1/4	485.0	11.1
C.P.	6,352	111		6,463	7-1/2	8-5/12.	17-3/4	33-2/3	766.0	8.4
D.R.	5,337	307		5,644		2-1/13	6-1/4	8-1/3	138.0	40.9
C.R.										
S.S.	146,392	1,212	1,774	149,378	132-1/4	70-19/24	79-5/8	282-2/3	457.3	326.6
Stream	109,065	373	12,572	121,980	232-3/8	77-1/2	44-1/8	354	336.6	362.5
Swamp										
Total	306,831	3,547	14,369	324,747	396-1/8	215-7/12	265-7/24	887	3,814.9	85.1

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



W. 281. Dense mature stand of virgin white pine timber on Deception Creek, Coeur d'Alene National Forest.



W. 640. Dense pole stand of white pine timber type near Monumental Lookout, Coeur d'Alene National Forest.

B. Checking Results

The checking report by P. S. Simcoe is included at the end of this report.

C. Crew Organization

The tendency in the past has been to experiment extensively with crew organization. Experiments with size, speed, supervision necessary and experience of men on crew have been made. Although certain limited areas may be worked by larger crews the general tendency is now toward small crews, both on scout and regular work.

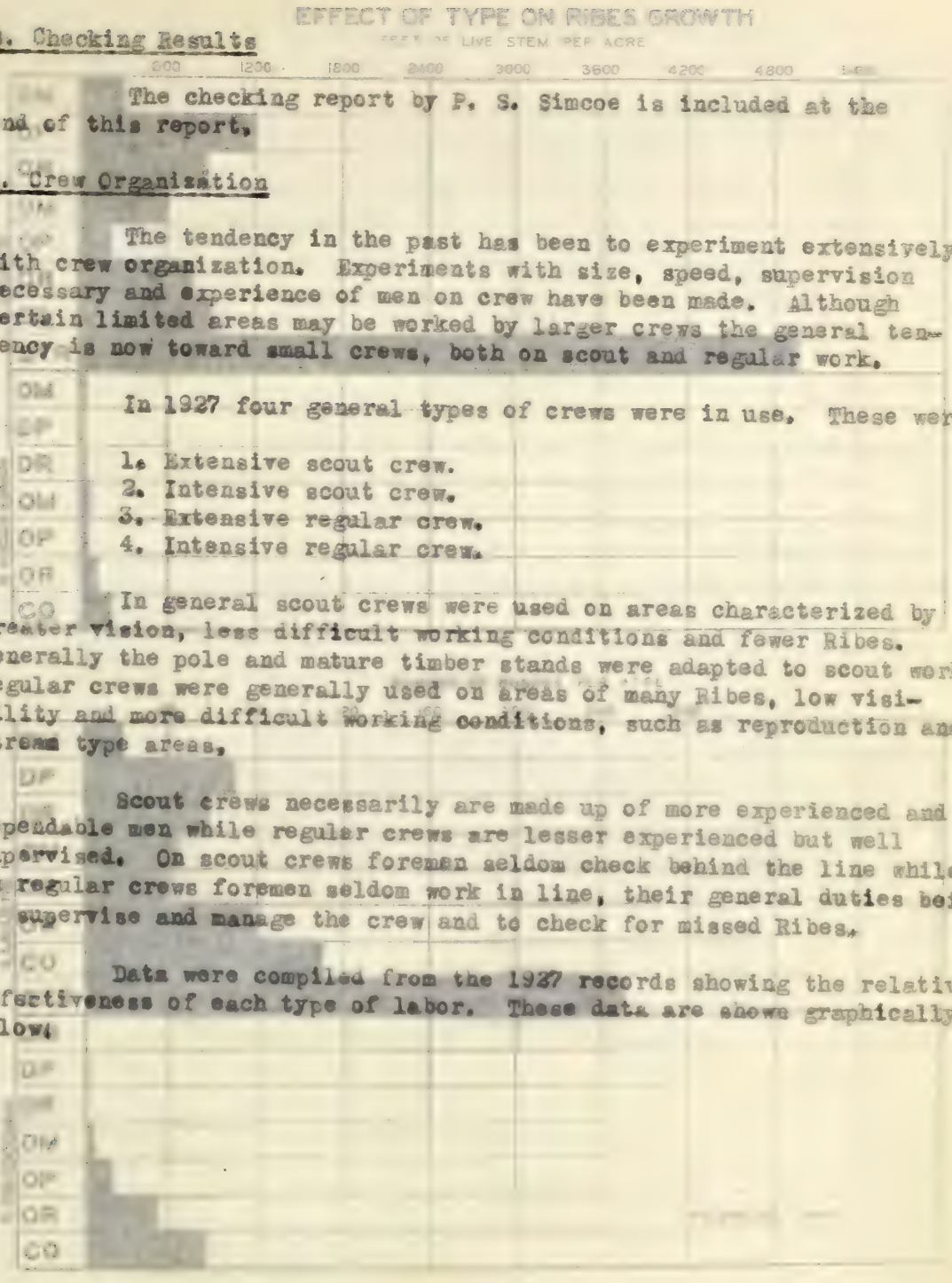
In 1927 four general types of crews were in use. These were:

1. Extensive scout crew.
2. Intensive scout crew.
3. Extensive regular crew.
4. Intensive regular crew.

In general scout crews were used on areas characterized by greater vision, less difficult working conditions and fewer Ribes. Generally the pole and mature timber stands were adapted to scout work. Regular crews were generally used on areas of many Ribes, low visibility and more difficult working conditions, such as reproduction and stream type areas.

Scout crews necessarily are made up of more experienced and dependable men while regular crews are lesser experienced but well supervised. On scout crews foremen seldom check behind the line while on regular crews foremen seldom work in line, their general duties being to supervise and manage the crew and to check for missed Ribes.

Data were compiled from the 1927 records showing the relative effectiveness of each type of labor. These data are shown graphically below:



5. Checking records

The checking report by F. S. Simons is included at the end of this report.

6. Crew Organization

The tendency in the past has been to experiment extensively with crew organization. Experiments with size, speed, supervision necessarily and experience of men on crew have been made. Although certain limited areas may be worked by larger crews the general tendency is now toward small crews, both on scout and regular work.

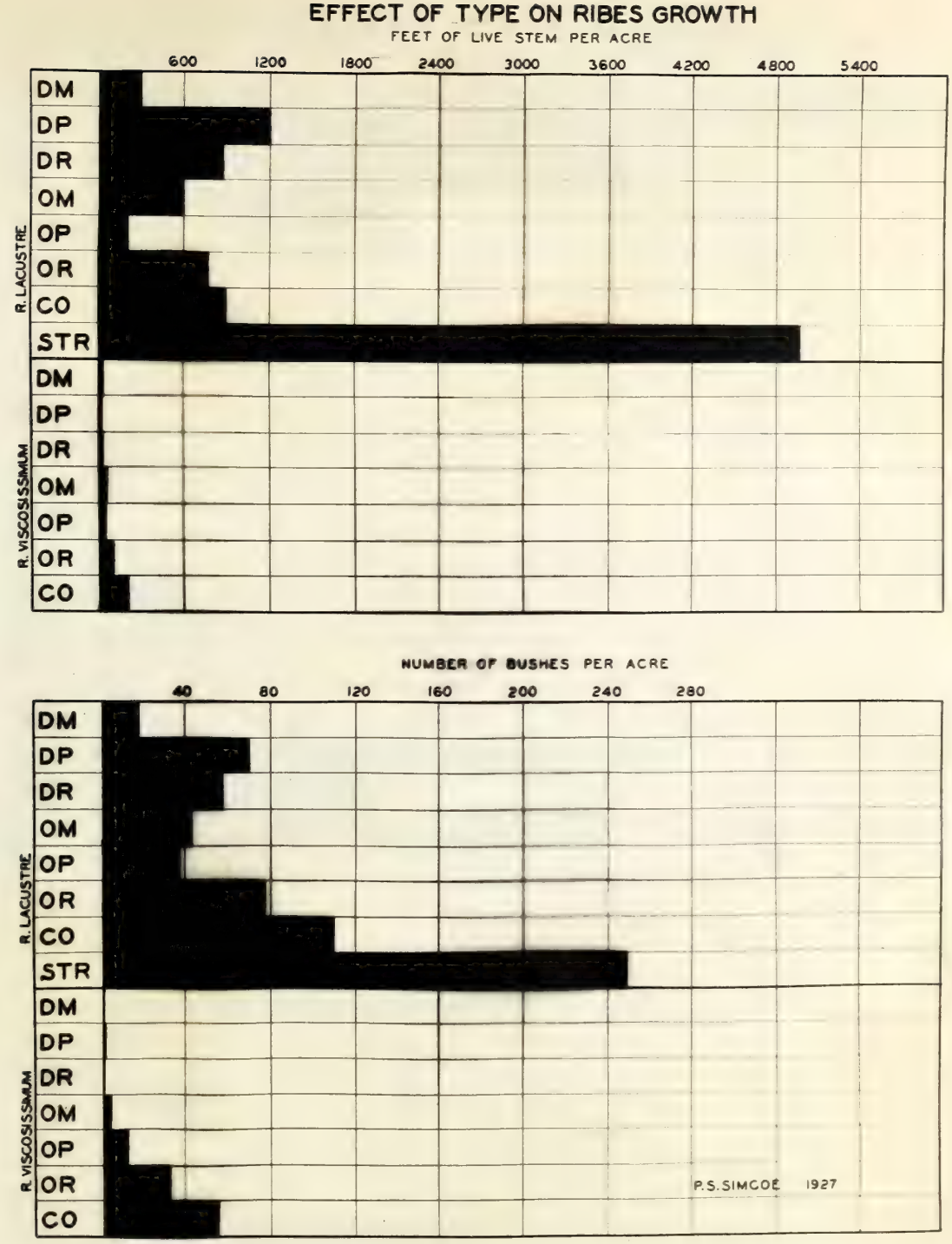
In 1927 four general types of crews were in use. These were:

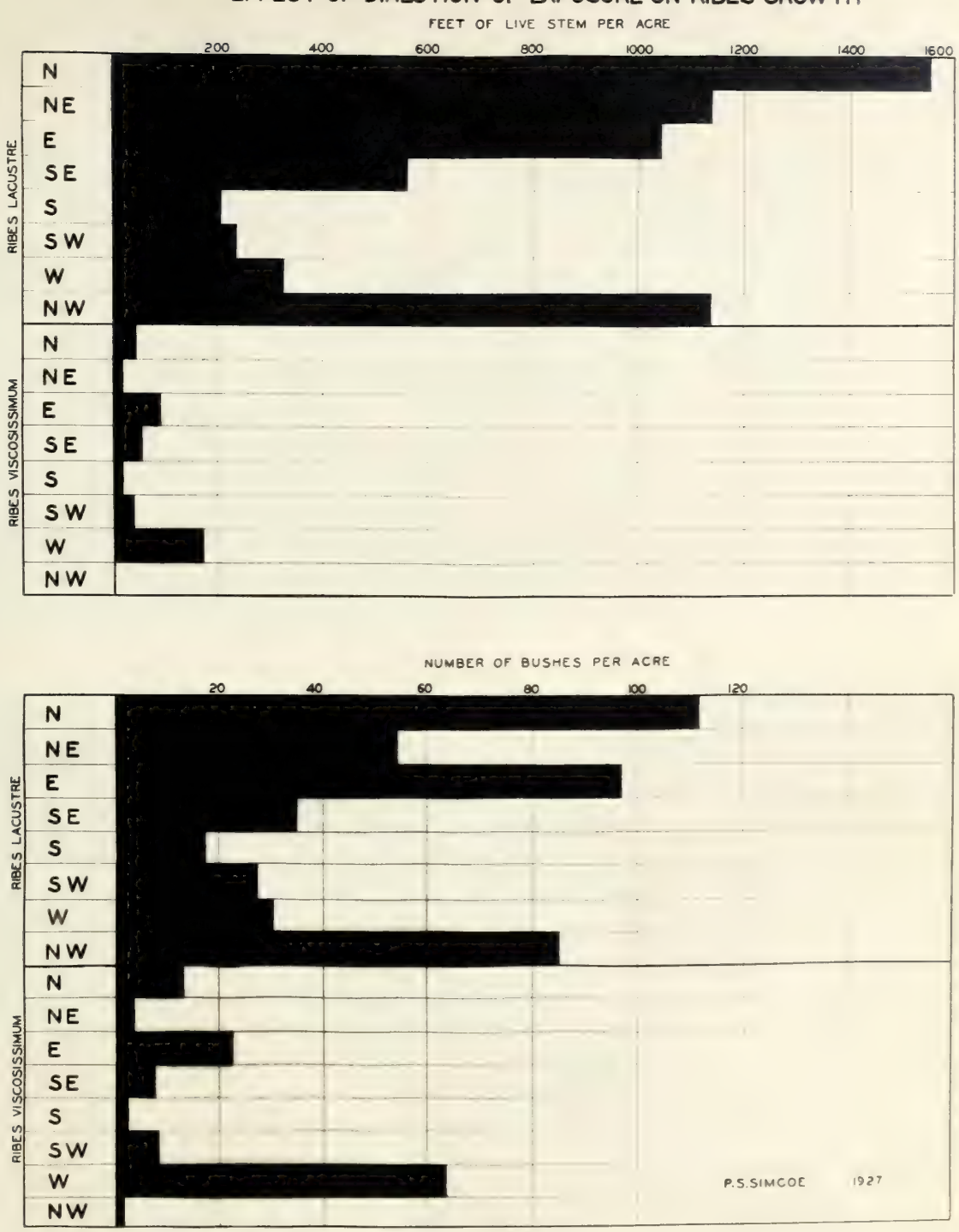
1. Extensive scout crew.
2. Intensive scout crew.
3. Extensive regular crew.
4. Intensive regular crew.

In general scout crews were used on areas characterized by greater vision, less difficult working conditions and fewer Ribes. Generally the pole and mature timber stands were adapted to scout work. Regular crews were generally used on areas of many Ribes, low vitality and more difficult working conditions, such as reproduction and stream type areas.

Scout crews necessarily are made up of more experienced and dependable men while regular crews are lesser experienced but well supervised. On scout crews foremen seldom check behind the line while on regular crews foremen seldom work in line, their general duties being to supervise and manage the crew and to check for missed Ribes.

Data were compiled from the 1927 records showing the relative effectiveness of each type of labor. These data are shown graphically below:


EFFECT OF TYPE ON RIBES GROWTH
FEET OF LIVE STEM PER ACRE
600
1200
1800
2400
3000
3600
4200
4800
5400
R. LACUSTRE
DM
DP
DR
OM
OP
OR
CO
STR
R. VISCOSISSIMUM
DM
DP
DR
OM
OP
OR
CO
NUMBER OF BUSHES PER ACRE
40
80
120
160
200
240
280
R. LACUSTRE
DM
DP
DR
OM
OP
OR
CO
STR
R. VISCOSISSIMUM
DM
DP
DR
OM
OP
OR
CO
P.S. SIMCOE 1927


EFFECT OF DIRECTION OF EXPOSURE ON RIBES GROWTH
FEET OF LIVE STEM PER ACRE
200
400
600
800
1000
1200
1400
1600
RIBES LACUSTRE
N
NE
E
SE
S
SW
W
NW
RIBES VISCOSISSIMUM
N
NE
E
SE
S
SW
W
NW
NUMBER OF BUSHES PER ACRE
20
40
60
80
100
120
RIBES LACUSTRE
N
NE
E
SE
S
SW
W
NW
RIBES VISCOSISSIMUM
N
NE
E
SE
S
SW
W
NW
P.S.SIMCOE 1927



W. 610. Crew at work on stream type -- 1927.



W. 697. Showing disposal of bushes after pulling -- 1927.

The curves, indicated scout or crew, represent the work of experienced scouts and that of regular laborers. The curves show the extent to which the average work done by a scout or regular laborer, working in various sized crews and various types, was above or below the season average.

Points at which no work was done by a given crew are indicated by breaks in the scout curve or by breaks centered by a "0" in the crew curve. Points represented by only a small amount of work, or weak points, are indicated by a question mark on either curve.

What do these curves show?

1. The little data available indicates that work by 7-man crew, either scout or regular, is largely below average and that such a large crew should not be used.

2. The best work done by scouts was by the 3 and 4 man crew where all work done was well above the season average. Five man scout crews can be employed in the open timber stands and on cutover areas where crew management is simplified.

3. Crews do best work in formations of 4 to 6 men although a 3-man crew may be used under conditions favoring it.

4. In general scouts work far more effectively on timbered areas and, to some extent, on reproduction areas than do regular crews.

5. On stream types, where the job is largely pulling, crew men do about as well as scouts and, because they are lesser paid men, should be used if more experienced men are not available.

6. Scouts work more effectively on cutover areas then do regular crews.

D. Pre-eradication

Before eradication can be undertaken on an area there must be a preliminary examination of that area as a basis for organizing the operation. This usually involves two steps. The first is the preliminary survey which determines whether or not the area is suitable for the experiment or whether or not it is economically feasible to protect the area. Reconnaissance data, if such work has been done intensively, will give this information. If not it is necessary to make the survey.

The second step in pre-eradication is the actual covering of the area in a methodical manner in such a way as to give a fairly accurate type map, locate work units and get other information sufficient on which to base plans.

An attempt was made to apply pre-eradication in 1927. The late snows made it impossible to start this work until June 7. Heavy

late snows made it impossible to start this work until June 7. Nearly an attempt was made to apply pre-eradication in 1937. The client on which to base plans.

The second step in pre-eradication is the actual covering of the area in a methodical manner in such a way as to give a fairly accurate type map, locate work units and get other information suitable for the experiment or whether or not it is economically feasible to protect the area. Reconnaissance data, if such work has been done intensively, will give this information. If not it is necessary to make a preliminary examination of that area as a basis for organizing the operation. This usually involves two steps. The first is the preliminary survey which determines whether or not the area is suitable for the experiment or whether or not it is economically feasible to protect the area. Reconnaissance data, if such work has been done intensively, will give this information. If not it is necessary to make the survey.

Before eradication can be undertaken on an area there must be

D. Pre-eradication

6. Scouts work more effectively on cutover areas than do regular crews.

5. On stream types, where the job is largely pulling, crew men do about as well as scouts and, because they are lesser paid men, should be used if more experienced men are not available.

4. In general scouts work far more effectively on timbered areas and, to some extent, on reproduction areas than do regular crews.

3. Crews do best work in formations of 4 to 6 men although a 3-man crew may be used under conditions favoring it.

2. The best work done by scouts was by the 3 and 4 man crew where all work done was well above the season average. Five man scout crews can be employed in the open timber stands and on cutover areas where crew management is simplified.

1. The little data available indicates that work by 7-man crew, either scout or regular, is largely below average and that such a large crew should not be used.

What do these curves show?

or weak points, are indicated by a question mark on either curve. in the crew curve. Points represented by only a small amount of work, dicated by breaks in the scout curve or by breaks centered by a "0" Points at which no work was done by a given crew are in-

the season average.

working in various sized crews and various types, was above or below the extent to which the average work done by a scout or regular laborer of experienced scouts and that of regular laborers. The curves show The curves, indicated scout or crew, represent the work

rain most of the period between June 7 and the start of eradication on June 15 so hampered the work that the pre-eradication crew was able only to traverse and type block boundaries. In a few cases the crew of 2 men was able to strip interiors of blocks. Although the pre-eradication results fell short of what was originally expected much useful information was gotten, acreage of blocks was secured and the camp bosses were enabled to spend correspondingly more of their time actually supervising the crew work.

In addition to the work done on the area eradicated in 1927 the pre-eradication crew spent more than a week making an extensive survey of the area lying just north of that eradicated. After the close of eradication work an enlarged crew of experienced men were employed for pre-eradication on the areaproposed for eradication in 1928. The latter work was done by a new method devised to eliminate the deficiencies of the old method. It is described in a supplement to this report.

The results of pre-eradication are shown on a map, one copy of which is on file in Washington and one in the Spokane,Office.

E. Experiments

1. Accuracy of crew counts. An authentic measurement of Ribes bushes removed from an area, both by number and feet of live stem, is desirable from all standpoints, especially the ecological and pathological. In the past the means used was to rely on a count by the men actually pulling the bushes and recorded by the foreman at intervals. Size of these bushes was determined by an experiment carried on by the checking crew and described in the checking report.

Since there is much difference of opinion as to what actually constitutes a bush, especially where bushes are numberous and apparently have layered from other bushes, it is evident that crew counts are subject to error. Further, men engaged in pulling are liable to err in counting and in carrying numbers until recorded.

In order to get accurate data on this point further experiments will have to be made by use of advance strips on which number of bushes and feet of live stem are recorded and compared with counts turned in by crews. It is necessary to keep the purpose of such experiments from men during the pulling.

A small experiment was made in 1927 to ascertain whether or not there were apparent wholesale variations in crew counts. Obviously this experiment could not be conducted with the recorder following the crews because their counts may have been influenced by the presence of the recorder. It was necessary to select areas where the crew would be working at least two days with assnearly identical conditions as possible. Two areas were chosen and the experiment tried on two crews.

rain west of the period between June 7 and the start of eradication on June 15 so hampered the work that the pre-eradication crew was only to traverse and type block boundaries. In a few cases the crew of 3 men was able to strip interiors of blocks. Although the pre-eradication results fell short of what was originally expected much useful information was gotten, acreage of blocks was squared and the camp bosses were supplied to spend correspondingly more of their time actually supervising the crew work.

In addition to the work done on the area eradicated in 1937 the pre-eradication crew spent more than a week making an extensive survey of the area lying just north of that eradicated. After the close of eradication work an enlarged crew of experienced men were employed for pre-eradication on the area proposed for eradication in 1938. The latter work was done by a new method devised to eliminate the deficiencies of the old method. It is described in a supplement to this report.

The results of pre-eradication are shown on a map, one copy of which is on file in Washington and one in the Spokane office.

E. Experiments

1. Accuracy of crew counts. An authentic measurement of Bibes bushes removed from an area, both by number and feet of live stem, is desirable from all standpoints, especially the ecological and pathological. In the past the means used was to rely on a count by the men actually pulling the bushes and recorded by the foreman at intervals. Size of these bushes was determined by an experiment carried on by the checking crew and described in the checking report.

Since there is much difference of opinion as to what actually constitutes a bush, especially where bushes are numerous and apparently have layered from other bushes, it is evident that crew counts are subject to error. Further, men engaged in pulling are liable to err in counting and in tallying numbers until recorded.

In order to get accurate data on this point further experiments will have to be made by use of advance strips on which number of bushes and feet of live stem are recorded and compared with counts turned in by crews. It is necessary to keep the purpose of such experiments from men during the pulling.

A small experiment was made in 1937 to ascertain whether or not there were significant wholesale variations in crew counts. Obviously this experiment could not be conducted with the recorder following the crews because their counts may have been influenced by the presence of the recorder. It was necessary to select areas where the crew would be working at least two days with necessarily identical conditions as possible. Two areas were chosen and the experiment tried on two crews.

In each case the crew counted bushes in the regular manner the first day. On the second day the recorder kept the count and live stem record. Conclusions were based on a comparison between the record kept by the crew and that taken by the recorder. Results are shown in table 7.

TABLE NO. 7

Accuracy of Crew Counts

Counting Method	Crew No.	No. Men	Ribes Pulled	Acreage	Time	No. Ribes 8 hr. basis	Ribes per Acre
Crew count	1-1st day	4	1487	2	6hrs	1975	745
Recorder	1-2nd day	4	2494	3	8 "	2494	831
Crew	2-1st day	5	2075	7½	8"	2075	277
Recorder	2-2nd day	5	3585	3	6 "	3447	962

In each case the count by the recorder was greater. The great variation in the second case results from the crew working where Ribes were more numerous even though the area was apparently almost identical with that worked the first day.

Although this experiment is too small to be of great value, it does indicate that there were no wholesale variations in the counts by the crew men. If any error was noticeable it was that crews were undercounting rather than overcounting.

2. Occurrence of Ribes by species on slopes. The experiment was conducted by the checking crew and discussed in the checking report.

3. Average feet of live stem per bush. This experiment was also conducted by the checking crew and is discussed in the checking report.

4. Efficiency of crew working at varying rates of speed as determined by successive coverage of some plots and a final check of all plots by checking crew. In this experiment 5 strips were laid out, each strip 20 chains long and 1 chain wide, by compass, abney and chain. All strips were in open mature timber with an understory of brush and reproduction and were laid out at right angles to the contour. By working up and down hill additional information was secured on the comparative efficiency of up and down hill working. A crew of 5 experienced men were used. Four men were in line and the foreman checked behind the line. Results are shown in table 8.

In each case the crew counted bushes in the regular manner the first day. On the second day the recorder kept the count and five steps record. Conclusions were based on a comparison between the record kept by the crew and that taken by the recorder. Results are shown in table 7.

TABLE NO. 7

Accuracy of Crew Counts

Counting Method	Crew No.	No. Steps Paired	Average	Time	No. Ribes per 8 hr. basis	Ribes per Acre
Crew count	1-1st day	4	1427	3 hrs.	1754	742
Recorder	1-2nd day	4	1414	8 "	4494	881
Crew	2-1st day	5	2070	7½ hr.	8075	477
Recorder	2-2nd day	5	2044	6 "	6467	464

In each case the count by the recorder was greater. The great variation in the second case results from the crew working where Ribes were more numerous even though the area was apparently almost identical with that worked the first day.

Although this experiment is too small to be of great value it does indicate that there were no noticeable variations in the counts by the crew men. If any error was noticeable it was that crews were undercounting rather than overcounting.

6. Occurrence of Ribes by species on a slope. The experiment was conducted by the checking crew and discussed in the checking report.

7. Average feet of live stem per bush. This experiment was also conducted by the checking crew and is discussed in the checking report.

8. Efficiency of crew work. At various rates of speed by brushing by successive coverage of same plots and a final check of all plots by checking crew. In this experiment 8 strips were laid out, each strip 30 chains long and 1 chain wide, by compass, sharp and plain. All strips were in open mature timber with an understory of brush and reproduction and were laid out at right angles to the contour. By working up and down hill additional information was secured on the comparative efficiency of up and down hill working. A crew of 5 experienced men were used. Four men were in line and the foreman checked behind the line. Results are shown in table 8.

TABLE NO. 8

Experiment on Speed of Working and Relative Efficiency by Successive Workings

Method of Working Speed	Strip No.	Direction of Working	Bushes Pulled		Bushes Missed		% Efficiency		Time required for Working	Live Stem Missed Per Acre
			No.	Feet Live Stem	No.	Feet Live Stem	No.	Feet Live Stem		
Normal	1	Up	19	164	10	58	65.5	73.8	29 minutes	29
Normal	1	Down	2	9	8	49	72.4	77.9	27 minutes	24
Normal	1	Up	4	33	4	16	86.2	92.8	35 minutes	8
Normal	1	Down	0	0	4	16	86.2	92.8	30 minutes	8
Checkers	1		4	16	0	0	100.0	100.0		0
Total	1		29	222	0	0			121 minutes	0
Fast	2	Up	21	281	18	168	53.8	62.6	21 minutes	84
Normal	2	Down	7	128	11	40	71.8	91.1	30 minutes	20
Checkers	2		11	40	0	0	100.0	100.0		0
Total	2		39	449	0	0			51 minutes	0
Fast	3	Up	48	840	10	67	80.8	92.6	55 minutes	33
Checkers	3		10	67	0	0	100.0	100.0		0
Total	3		58	907	0	0			55 minutes	0
Normal	4	Down	62	2,179	15	268	80.5	89.0	43 minutes	134
Checkers	4		15	268	0	0	100.0	100.0		0
Total	4		77	2,447	0	0			43 minutes	0

Area of each strip two acres.

Table 23.3

Expenditure on Diesel oil, motor car and lorries

Differences by Occupation, Income and Location

Occupation of Household Head	Urban/ Rural	Region	Number of Households	Mean Expenditure per Household	Mean Expenditure per Household Member	Mean Expenditure per Household Member Aged 15 Years and Over	Mean Expenditure per Household Member Aged 15 Years and Over Who Purchased
Professional, Technical and Related Workers	Urban	Central	4	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Administrative, Executive and Managerial Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Clerical and Related Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Sales Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Farmers, Fishermen, Hunters, Loggers and Related Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Miners, Quarrymen and Related Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Transport and Communications Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Craftsmen, Production Workers and Related Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Service Workers	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
Unspecified	Urban	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00
	Rural	Central	0	0.00	0.00	0.00	0.00
		Eastern	0	0.00	0.00	0.00	0.00
		Nairobi	0	0.00	0.00	0.00	0.00
		Rift Valley	0	0.00	0.00	0.00	0.00
		Western	0	0.00	0.00	0.00	0.00

Strip 5 was also worked but no final check was made. In strip 5 the crew worked down hill at a fast rate and then up hill at a normal rate. On the first time over 15 bushes and 419 feet of live stem were pulled. The second time over 14 bushes and 85 feet of live stem were pulled.

Although the experiment was small it showed very definitely that crews working at a fast rate of speed get a high per cent of the large or dominant bushes. In mature types on slopes suppressed bushes make up the majority of those missed. Crews working at a normal rate of speed (a slow pace) do get higher efficiency but the difference is principally in greater number of suppressed bushes pulled. Since the dominant bushes are the most dangerous from the standpoint of rust control crews on pole or mature areas should be speeded up to the point where high efficiency is secured on dominant bushes only, with no special effort to get suppressed bushes.

5. Size, species and survival of Ribes on various aged cutover areas to arrive at proper time for eradication. This experiment is discussed in a supplement to this report.

6. Practicability of working swamps by hand pullers. Swampy areas along streams in the Inland Empire are usually densely populated with Ribes either R. petiolare or G. inermis. To remove the Ribes from such areas is an expensive proposition. In order to determine the costs of hand pulling such areas a large experiment was conducted in 1927. Results were as follows: 15.5 acres worked, 48,580 Ribes pulled almost 99 per cent of which were G. inermis. $51.05 average cost per acre.

On a part of this area where bushes were densely matted over the entire ground and intertwined with brush and logs, a crew of 6 men were able to cover about one-quarter of an acre in a day. At this rate costs on such heavy swamp runs about $150.00 per acre. It was necessary in the latter case to entirely clear the area of brush and logs in order to get at the roots of Ribes bushes.

Figures on handpulling of swamp areas show that costs by the method are prohibitive when chemical eradication can be done for much less.

7. Government owned transport as compared with private hauling. During the 1927 field season all hauling of men, supplies and equipment was done with government owned vehicles. The following figures show the amount and costs of hauling done by C.M.C. truck purchased for the purpose:

Freight (supplies and equipment)	
Between Spokane and Honeysuckle R.S.	108,900#
" Coeur d'Alene and " " "	13,477#
In vicinity of camps	29,450#

strip 3 was also worked but no final check was made.

strip 3 the crew worked down hill at a fast rate and then up hill at a normal rate. On the first time over 15 bunkes and 419 feet of line, stem were pulled. The second time over 14 bunkes and 85 feet of line stem were pulled.

Although the experiment was small it showed very definitely that crews working at a fast rate of speed get a high per cent of the large or dominant bunkes. In bunker types on slopes suppressed bunkes make up the majority of those missed. Crews working at a normal rate of speed (a slow pace) do get higher efficiency but the difference is principally in greater number of suppressed bunkes pulled. Since the dominant bunkes are the most damaging from the standpoint of rust control crews on pole or mature areas should be speeded up to the point where high efficiency is secured on dominant bunkes only, with no special effort to get suppressed bunkes.

5. Life, species and survival of Ribes on various cut-over areas to arrive at proper time for eradication. This experiment is already in a supplement to this report.

6. Practicability of burning over or hand pulling. Swampy areas along streams in the Intake Unit are usually densely populated with Ribes either R. petiolare or R. hirtum. To remove the Ribes from such areas is an expensive proposition. In order to determine the cost of hand pulling such areas a large experiment was conducted in 1927. Results were as follows: 18.5 acres worked, 48,300 Ribes pulled almost 99 per cent of which were R. hirtum. $21.05 average cost per acre.

On a part of this area where bunkes were densely matted over the entire ground and interwined with brush and logs, a crew of 6 men were able to cover about one-quarter of an acre in a day. At this rate crews on such heavy swamp runs about $150.00 per acre. It was necessary in the latter case to entirely clear the area of brush and logs in order to get at the roots of Ribes bunkes.

Figures on manpulling of swamp areas show that costs by the method are prohibitive when essential eradication can be done for much less.

7. Government owned transport as contrast with private hauling. During the 1927 field season all hauling of men, supplies and equipment was done with government owned vehicles. The following figures show the amount and costs of hauling done by G.M.C. trucks used for the purpose:

Transport (supplies and equipment)	
In vicinity of Camps	25,380#
" Foley's Ranch and Cabin	15,477#
Transport Camps and Lookouts R.S.	138,950#

Men:
Between Spokane and Honeysuckle R. S. - - - - - - - - -248

By private hauling the lowest commercial rates obtainable were;

Spokane to Honeysuckle - - - - - - - - - - - - - - - -	$0.70 per cwt.
Coeur d'Alene to Honeysuckle - - - - - - - - - - - - -	0.45 " "
Vicinity of camps- - - - - - - - - - - - - - - - - - -	0.10 " "
Men (Spokane to Honeysuckle) - - - - - - - - - - - - -	2.50 each

Cost by private transport	
Supplies and equipment - - - - - - - - -	$1090.05
Men- - - - - - - - - - - - - - - - - - -	620.00
Total	$1710.05

Actual cost by G.M.C. truck	
Depreciation on truck, (8825 miles)- -	346.37
(Based on total run of 40,000 miles)	
Operation, including driver's salary and expenses - - - - - - - - - - - - - - -	861.05
Total	$1207.42
Saving over private hauling- -	$ 502.63

In addition to the actual saving the truck was always available where needed and much grief in connection with transportation was eliminated. Furthermore, the truck driver acted as warehouseman at the central warehouse keeping proper records of all supplies sent to camps and cargoing all shipments for packing. Otherwise it would have been necessary to hire a competent man for this work.

This venture in Government owned transport has thus been a decided success.

8. Pure scout work as compared with work by regular methods. Work by scout crews during the 1926 season demonstrated the desirability of covering areas, a large part of which had mature or pole sized timber, by more rapid methods. Accordingly plans were laid, provided a suitable area was available, to make one of the 5 units as nearly a pure scout unit as conditions would warrant. Such an area was found. However, the conditions on the areas worked by the other units were such that at least one scout crew was necessary in each of the other 4 units. There were not a sufficient number of experienced scouts left to make the fifth unit a pure scout organization so a small part of unit 5 personnel were regular laborers. There was enough stream and reproduction type to keep the regular crew men busy so that the method was satisfactory in general.

The results as shown in tables 2 to 6 represent the work by each unit, Camp 5 being the scout unit. The relative costs of the scout work as compared with the other work are shown in table 10. Relative efficiency of all work is shown in the checking report.

Between Spokane and Honeyweckle R. R. - - -

V. Discussion and Analysis of Some Experiments

The small amount of experimental work done on counting of Ribes pulled by crewmen does not lead to any startling conclusions. Generally it is the fairest way of determining progress by amount of host plants removed. However, it has been deemed advisable to continue this experiment by large scale studies based on advance check strips.

As was expected the work done in the scout camp was generally lower in efficiency than was the case in the regular camp units. An analysis of the report shows, however, that bushes left were, to a large extent, those smaller bushes lacking in vigor and vitality. It now appears that scout work in this unit was pushed faster than it should have been to give adequate protection. The value of the experiment was not lessened, however, because the results show that crews moving at this rate of speed do not get enough of the live stem to give safe results. Furthermore, it is not inconceivable that certain areas, in the future, must be covered at a low cost. Working at such a rapid pace does give protection to some extent and is certainly better than not working the area at all.

It will be noted in table 10 that costs in the scout unit averaged far less per acre than did the average costs in the other units. The whole experiment indicates that scout work, wherever practical, can be relied upon to get work done at a lesser cost and is very satisfactory provided the lessened efficiency would still give adequate protection.

VI. Statement and Analysis of Cost

A. Total Cost of Eradication.

1. Cost by camps. Table 9 gives a summary of the costs of the project by camps.

F. Discussion and Analysis of Some Experiments

The small amount of experimental work done on combating of bine pulled by crewmen does not lend to any startling conclusions. Generally it is the fairest way of determining progress by amount of bent plants removed. However, it has been deemed advisable to continue this experiment by large scale studies based on advance check strips.

As was expected the work done in the scout camp was generally lower in efficiency than was the case in the regular camp units. An analysis of the report shows, however, that bushes left were, to a large extent, those smaller bushes lacking in vigor and vitality. It now appears that scout work in this unit was pushed faster than it should have been to give adequate protection. The value of the experiment was not lessened, however, because the results show that crews moving at this rate of speed do not get enough of the live stem to give safe results. Furthermore, it is not inconceivable that certain areas, in the future, must be covered at a low cost. Working at such a rapid pace does give protection to some extent and is certainly better than not working the area at all.

It will be noted in table 10 that costs in the scout unit averaged far less per acre than did the average costs in the other units. The whole experiment indicates that scout work, wherever practical, can be relied upon to get work done at a lesser cost and is very satisfactory provided the lessened efficiency would still give adequate protection.

4. Total Cost of Eradication.

1. Cost by camps. Table 9 gives a summary of the costs of the project by camps.

TABLE NO. 9

Cost of Eradication by Camps

		Camp 1	Camp 2	Camp 3	Camp 4	Camp 5	Total
Salary	Laborers	$2,839.49	$2,520.81	$3,597.85	$3,151.90	$1,823.60	$ 13,933.65
	Foremen and Scouts	697.51	1,092.56	763.44	945.50	677.35	4,176.36
	Scout Foremen	539.96	82.41	216.56	221.10	198.00	1,258.03
	Supervisors	678.94	563.13	753.15	771.27	540.43	3,306.92
Subsistence	Food	1,781.21	1,299.03	1,906.48	1,819.52	1,159.36	7,965.60
	Cooking Salary	612.61	485.00	618.25	534.61	419.33	2,669.80
	Trucking Food	190.17	181.11	217.34	190.17	126.78	905.57
	Packing Food	235.40	224.19	269.04	235.40	156.94	1,120.97
Equipment and travel	Equipment Cost	241.31	229.82	275.78	241.32	160.87	1,149.10
	Trucking of Equipment & Men	63.39	60.37	72.44	63.39	42.26	301.85
	Packing	78.47	74.75	89.68	78.47	52.31	373.66
	Checking	469.05	446.70	536.05	469.05	312.70	2,233.55
	Pre-eradication	151.97	144.73	173.68	151.97	101.32	723.67
	General*	133.84	127.46	152.95	133.84	89.22	637.31
	Gross Cost	$8,713.32	$7,532.05	$9,642.69	$9,007.51	$5,860.47	$40,756.04
	Meals not Charged**	252.06	94.83	642.55	188.14	108.41	1,285.99
	Net Total Cost	8,461.26	7,437.22	9,000.14	8,819.37	5,752.06	39,470.05

*Includes cost of operating small Ford and other general expenses.
**Meals served visitors or charged in checking and pre-eradication costs.

Cost of Production Per Case

| Items | | |

2. Cost per acre by camps.

TABLE NO. 10

Cost per Acre by Type--1927

Grad. Type	Camp #1	Camp #2	Camp #3	Camp #4	Camp #5	All Camps
D.M.	0.83	1.20	0.75	0.51	0.76	0.73
O.M.	1.02	2.40	1.22	1.36	0.53	1.24
D.P.	1.84	1.13	0.53	0.0952	0.37	0.80
O.P.	4.75	5.81	1.94	0.47	0.29	0.77
D.R.	1.63	3.33	2.57	--	0.39	1.53
O.R.	5.11	5.09	5.59	11.92	--	5.36
C-O	3.18	4.08	3.20	6.66	4.01	3.80
Stream	16.19	18.69	11.25	17.43	7.04	12.66
Swamp	--	51.05	--	--	--	51.05
Av'g.	2.48	5.04	2.33	2.28	1.51	2.401

Of this total checking cost $0.136 per acre and pre-eradication $0.044 per acre or a total for both operations of $0.18 per acre.

3. Composite man day charges. All costs of eradication must be charged against the man who is actually doing the pulling. Salaries of pullers, while actually engaged upon pulling, constitute one division of costs and all other charges (supervision, checking, subsistence, pre-eradication, travel time, transportation, equipment and supplies - other than subsistence supplies - etc.) represent the composite charge. Composite charges are lumped and divided according to the actual number of man days pulling time. The following table shows the composite charge per man day in each camp and also the total charges for each class of labor.

TABLE NO. 11

Composite Costs per Man Day

Camp	Composite Charge	Total cost per day per labor class			Average all Classes
		Laborer	Foreman or Scout	Scout Foreman	
1	3.30	6.00	6.40.	6.60	6.64
2	3.08	5.78	6.18	6.38	6.11
3	3.88	5.68	5.98	6.18	5.96
4	3.33	6.03	6.43	6.63	6.53
5	3.44	6.14	6.54	6.74	6.43
All Camps	3.18	5.88	6.28	6.48	6.24

3. Cost per acre by camps.

TABLE NO. 10

Type.	Camp A	Camp B	Camp C	Camp D	All Camps
D.M.	0.85	1.20	0.75	0.81	0.76	0.72
O.M.	1.08	2.40	1.22	1.26	0.82	1.24
D.P.	1.64	1.13	0.32	0.0858	0.47	—
O.C.	4.72	5.81	1.94	0.47	0.29	0.77
D.H.	1.23	0.03	2.87	—	0.19	1.32
O.H.	3.11	8.05	5.39	11.92	—	5.56
C-O	8.18	4.02	2.30	6.66	4.01	3.80
Steam	16.19	18.69	11.5	17.43	7.04	1.86
Steno	—	5.08	—	—	—	1.05
Tr'g.	2.68	2.04	2.32	2.28	1.51	2.401

Of this total cleaning cost 50.12¢ per acre and pre-preparation 30.044 per acre or a total for both operations of $0.16 per acre.

c. Composite gang for clearing. All costs of eradication must be charged against the area cleared by the gang doing the pulling. Salaries of pullers, while usually carried upon pulling, constitute one division of costs and all other charges (equipment, shoeing, subsistence, pre-examination, travel time, transportation, equipment and supplies - other than ordinary supplies - etc.) represent the composite charge. Composite charges are lumped and divided according to the actual number of man days in each camp and also the total charges for each class of labor.

TABLE NO. 11

Camp	Composite Charge	Total cost per day per labor class			Average All Classes
		Laborer	Pioneer or Axman	Cook & Swamper	
1	5.30	5.00	5.10	5.00	5.24
2	3.09	3.73	3.14	3.38	3.11
3	3.85	3.84	3.44	3.19	3.35
4	3.32	3.19	3.11	3.00	3.38
5	3.44	3.14	3.34	3.74	3.49
All Camps	4.19	3.82	3.84	3.48	3.24

Size of camp has the greatest bearing on the composite charge per man day. Overhead charges vary but little between small and large camps. Camp 3 was the largest camp and Camp 5 the smallest.

Amount of paid time lost to actual eradication is next in importance. Lost time includes travel time, camp construction, etc. Elimination of lost time is a problem in organization and administration of the unit.

B. Subsistence.

Table 12 shows subsistence charges for the various units as well as the total. Here again the greatest factor in determining costs is the size of the unit in number of men. Economies must be relied upon most by the supervisor, however, because conditions usually determine the size of camp which can be best employed. Further, a small camp can be so much more efficiently employed that a maximum in number of men per unit falls between 25 and 30.

TABLE NO. 12

Camp	Meals Served	Total Cost	Cost per Meal
1	7,058	2,819.39	$0.40
2	5,891	2,189.33	0.37
3	8,632	3,011.11	0.35
4	6,763	2,779.70	0.41
5	3,953	1,862.41	0.47
All	32,297	12,661.94	0.39

Total meal costs include cost of food, cost of cooking and cost of transporting food by truck and pack animals. Table 13 shows what the cost per meal for each cost item was.

Site of camp has the greatest bearing on the composite charge per man day. Overhead charges vary but little between small and large camps. Camp 3 was the largest camp and Camp 8 the smallest.

Amount of paid time lost tomoctual eradication is next in importance. Lost time includes travel time, camp construction, etc. Elimination of lost time is a problem in organization and administration of the unit.

5. Subsistence.

Table 12 shows subsistence charges for the various units as well as the total. Here again the greatest factor in determining costs is the size of the unit in number of men. Economies must be relied upon most by the supervisor, however, because constitute manually determine the size of camp which can be best employed. Further, a small camp can be no much more efficiently employed that a maximum in number of men per unit falls between 25 and 30.

TABLE NO. 12

Camp	Daily Ration	Total Cost	Cost per Meal
1	7,[illegible]	$ 8,[illegible].22	$0.40
2	6,811	$ 2,[illegible].22	0.37
3	5,[illegible]6	$ 4,[illegible].11	0.35
4	6,[illegible]8	$ 3,[illegible].70	0.41
5	1,[illegible]9	$ 1,[illegible].41	0.47
[illegible]	[illegible],[illegible]7	$ [illegible],[illegible].[illegible]	[illegible]

Total meal costs include cost of food, cost of cooking and cost of transporting food by truck and pack animals. Table 12 above what the cost per meal for each cost item was.

areas and do not offer TABLE NO. 13 field for development of the rust as do stream and reproduction types.

Camp	Cost Per Item per meal			
	Food	Cooking	Trucking	Packing
1	$0.253	$0.087	$0.027	$0.033
2	0.221	0.082	0.031	0.036
3	0.221	0.072	0.025	0.032
4	0.239	0.079	0.028	0.034
5	0.293	0.106	0.032	0.039
All	$0.247	$0.082	$0.027	$0.034

C. Checking and Pre-Eradication Costs.

Table 14 shows costs of checking and pre-eradication:

TABLE NO. 14

Camp	Checking		Pre-Eradication	
	Total Cost	Cost per Acre	Total Cost	Cost per Acre
1	$ 459.05	$0.137	$ 151.97	$0.044
2	446.70	0.303	144.73	0.098
3	536.05	0.142	173.68	0.045
4	469.05	0.121	151.97	0.037
5	312.70	0.082	101.32	0.027
All	$2,365.55	$0.136	$723.67	$0.044

D. Cost of Twine.

Three-ply white grocer's twine on 2# cones has proven satisfactory as trail marker. Costs for twine used were:

Total cost twine used $390.55
Average cost per acre for twine on area worked (16,457.5 acres) $ 0.0238

VII. Recommendations for Future Work

1. Speeding up of work on timbered areas by more general use of scouting methods. Generally Ribes are losing out or "going" on such

Crew	Cost per Line per Mesh			
	Mesh	Checking	Treating	Pre-Preparation
1	$0.[illegible]	$0.047	$0.027	$0.[illegible]
2	0.321	0.044	0.021	0.[illegible]
3	0.311	0.042	0.028	0.041
4	0.[illegible]	0.039	0.022	0.034
5	0.324	0.106	0.041	0.049
All	$0.342	$0.083	$0.027	$0.038

6. Checking and Pre-Preparation Costs.

Table 14 shows costs of checking and pre-preparation:

Table No. 14

Crew	Checking		Pre-Preparation	
	Total Cost	Cost per Acre	Total Cost	Cost per Acre
1	$ 469.[illegible]	$0.127	$ 191.87	$0.[illegible]
2	446.70	0.403	144.78	0.[illegible]
3	396.06	0.142	173.47	0.[illegible]
4	449.02	0.181	118.71	0.042
5	418.70	0.061	101.43	0.[illegible]
All	$[illegible]	$0.[illegible]	$[illegible]	$0.[illegible]

7. Cost of Twine.

Three-ply white grocer's twine on 4# cones has proven satisfactory as trail marker. Costs for twine used were:

Total cost twine used $[illegible]
Average cost per acre
for twine on area worked
(16,437.5 acres) $ 0.0388

VII. Recommendations for Future Work

1. Speeding up of work on stimbered areas by more general use of counting methods. Generally Ribes are losing out or "going" on such

areas and do not offer such a fertile field for development of the rust as do stream and reproduction types.

2. Greater concentration of effort on stream and reproduction areas.

3. Development of experts for delimiting timbered areas where the rust would not develop rapidly or at all.

4. Use of 3 or 4 man scout crews made up of experienced men on any but stream and reproduction areas.

5. Use of 4 to 6 man regular crews generally on stream and reproduction types.

6. Use of approximately 25 man units unless special conditions or arrangements call for a smaller unit.

7. Use of the pre-eradication system described in a supplement to this report when necessary.

8. Checking of approximately 2% of stream and reproduction type and 1/2 of 1% of other types worked.

9. Use of 3-ply white grocer's twine on 2# cones for trail marking.

10. The beginning of a study on eradicated areas to determine the degree of protection afforded the area by each of the eradication methods employed. This work should center around plot studies, plots being laid out ahead of eradication so that data concerning what was originally on the area will be available. Care will have to be taken in marking the plot that no marks are left by which crews would know where the boundaries of the plot were. After eradication the plots must be permanently marked for annual study.

11. Development of an improved method of eradication type designation. The present method allows for many variations. Different individuals are too apt to differ in opinion as to border line types and even distinctly different types. A solution is offered, in the supplemental discussion of pre-eradication, whereby areas are divided into classes ahead of the crews.

12. A rather extensive further research into eradication methods. To this work it is planned to assign a man experienced in Ribes eradication with temporary assistants necessary and authority to use eradication crews when needed.

13. Development, at an early date, of a random method of inspecting an area worked by eradication crews to show whether or not the work done was satisfactory from the control standpoint.

areas and do not offer much a fertile field for development of the rest as do stream and reproduction types.

2. Greater concentration of effort on stream and reproduction areas.

3. Development of experts for delimiting timbered areas where the rest would not develop rapidly or at all.

4. Use of 3 or 4 man scout crews made up of experienced men on any but stream and reproduction areas.

5. Use of 4 to 6 man regular crews generally on stream and reproduction types.

6. Use of approximately 35 man units unless special conditions or arrangements call for a smaller unit.

7. Use of the re-eradication system described in a supplement to this report when necessary.

8. Checking of approximately 2% of stream and reproduction type and 1/2 of 1% of other types worked.

9. Use of 3-ply white grocer's twine on 2% zones for trail marking.

10. The sampling of a study on eradicated areas to determine the degree of protection afforded the area by each of the eradication methods employed. This work should center around plot studies, plots being laid out ahead of eradication so that data concerning what was originally on the area will be available. Care will have to be taken in marking the plot that no marks are left by which crews would know where the boundaries of the plot were. After eradication the plots may be permanently marked for annual study.

11. Development of an improved method of eradication type description. The present method allows for many variations. Different individuals are too apt to differ in opinion as to border line types and even distinctly different types. A solution is offered, in the supplemental discussion of pre-eradication, whereby areas are divided into classes ahead of the crews.

12. A rather extensive further research into eradication methods. To this work it is planned to assign a man experienced in Bibee eradication with temporary assistants necessary and authority to use eradication crews when needed.

13. Development, at an early date, of a random method of inspecting an area worked by eradication crews to show whether or not the work done was satisfactory from the control standpoint.

SUMMARY OF RIBES ERADICATION IN IDAHO
1922 - 1927

Year	Type	Acres	No. Bushes Pulled	No. Bushes per Acre	Cost per Acre	Efficiency of Work: No. Bushes	Efficiency of Work: Ft. L.S.	Avg. Size Bush Pulled	Avg. Size Bush Missed	No. Bushes Missed per Acre	Ft. L.S. Missed per Acre
1922	Mature	300	19958	66½	$1.45	--	--	--	--	--	--
	Pole(50 yrs)	10	3260	326	2.35	--	--	--	--	--	--
	Dense Rep.	21	2367	113	1.59	--	--	--	--	--	--
	Old Burn-Rep	50	280	5½	0.096	--	--	--	--	--	--
	Open Rep.	33	2606	79	2.99	--	--	--	--	--	--
	Total	414	28471	69	$1.44	71.33	81.50	12.66	7.06	209.82	1480.64
1923	Crew	154.8	43238	279.3	16.16	--	--	--	--	--	--
	Scout	1543.2	10317	6.7	.48	--	--	--	--	--	--
	Total	1698.0	53555	31½	$1.91	--	--	--	--	--	--
1924	Stream	255.9	48626	190.0	6.60	--	--	--	--	--	--
	Ribes Free	2953.4	37753	12.9	.79	--	--	--	--	--	--
	Brush or Rep Uniform	1732.4	159125	91.9	2.36	--	--	--	--	--	--
	Brush or Rep Patchy	254.0	8850	34.8	1.57	--	--	--	--	--	--
	Dense Rep.	309.3	5925	19.1	1.54	--	--	--	--	--	--
	Fresh Burn	12.0	7037	588.4	12.55	--	--	--	--	--	--
	Total	5517.0	267316	48.4	$1.65	76.29	85.52	12.7	6.16	12.9	79.46
1925	Stream	149.4	45985	307.8	8.14	--	--	--	--	--	--
	Ribes Free	1093.1	2504	2.3	.50	--	--	--	--	--	--
	Open Mature	281.4	25860	91.9	2.59	--	--	--	--	--	--
	Brush,Uniform	1347.65	171286	127.1	6.44	--	--	--	--	--	--
	Brush,Patchy	733.75	66037	90.0	4.55	--	--	--	--	--	--
	Thicket	574.9	28976	50.4	2.23	--	--	--	--	--	--
	Fresh Burn	44.7	23284	520.9	8.72	--	--	--	--	--	--
	Rock Type	34.8	1836	52.8	2.71	--	--	--	--	--	--
	Total	4259.7	365768	85.9	$3.83	83.96	94.12	12.7	4.15	16.38	68.00
1926	Dense Mature	465	1041	2.2	.32	--	--	--	--	--	--
	Dense Pole	1612	11627	7.2	.53	--	--	--	--	--	--
	Dense Rep.	940.5	15651	16.6	1.13	69.00	--	--	3.03	7.46	22.6
	Open Mature	573	5989	10.5	.69	--	--	--	--	--	--
	Open Pole	4300.87	120380	28.0	.80	88.68	90.94	3.67	2.87	3.57	10.24
	Open Rep.	472.0	6579	14.0	.83	94.50	96.50	4.77	2.95	0.815	2.42
	Stream	501.63	217995	434.2	9.87	87.91	96.74	21.77	5.16	59.71	308.10
	Total	8865	379262	42.8	$1.26	91.16	94.98	5.06	3.59	22.72	81.56
1927	Dense Mature	2269.1	46315	20.4	.73	76.46	82.01	20.65	14.71	5.72	84.09
	Open Mature	6357.5	319895	50.3	1.24	82.41	89.29	14.17	7.96	18.83	149.94
	Dense Pole	1320.3	54028	40.9	.81	90.74	95.87	12.85	5.42	5.81	31.48
	Open Pole	1177.0	32101	27.3	.77	94.93	92.99	4.79	6.62	11.35	75.17
	Dense Rep.	1209.4	37160	34.3	1.53	80.38	89.57	15.40	7.35	14.24	104.60
	Open Rep.	618.3	136863	205.0	5.36	89.25	96.98	10.99	2.82	30.26	85.24
	Cutover	2482.5	840201	338.4	3.80	81.72	92.85	7.72	3.12	56.02	174.81
	Stream	987.9	553385	560.2	12.66	87.17	96.83	19.69	4.38	97.69	428.33
	Swamp	15.5	48580	3134.2	51.05	--	--	--	--	--	--
	Total	16437.5	2068533	126.0	$2.40	86.47	95.59	15.03	4.60	38.91	178.97

SUPPLEMENT NO. 1

DEVELOPMENT OF PRE-ERADICATION IN IDAHO

Since the eradication of the wild Ribes hosts of blister rust was first tried on an experimental basis, in the West, a constant effort has been made to find a satisfacotry method of classifying areas into eradication types or classes. Such a classification is necessary because of the wide variation in methods and costs of eradication between the various forest types or eradication classes.

In the early stages of the eradication experiment exp rience and the data gotten from the work formed the only basis for a later type classification. The early types used were based on number of Ribes found, combined with the factor "working conditions." However, the classes could be determined only after the area has been worked by crews. It was evident that such a system would be of little value in attempting to forecast best methods suited to a given area and the probable cost of eradication.

The next step, then, in attempting to designate eradication types was based on timber types and age classes almost solely since it was felt that these did not vary greatly in working conditions and final cost of coverage by crews. In certain barren and swampy areas where no timber was present the conditions were recognized and eradication types based on conditions were established.

While this system was better than any previously used and, in general, could be applied to almost any area, certain weaknesses began to show. The chief of these was that within a given type, wide variations in Ribes present, working conditions, etc., resulted in widely varying methods and costs of eradication. Again, in different eradication types it was found that given types widely varying in timber, age, density etc., were worked by similar methods which resulted in similar costs per acre for different types. It could be seen that such a system of type classification could not be used as a basis for intelligent and accurate estimation of costs and methods.

Late in August of the present season, 1927, it was realized that a better and cheaper method must be found. This new system was developed and was used in the pre-eradication work on the area to be worked in 1928. The method is based on experience largely. Five eradication classes were recognized. These classes are based on methods now in use and involve no new ones. The following definitions apply:

Class A

Class A areas are worked by present extensive scout crews. Class A areas, those on which the conditions are such that a crew of 3 or 4 experienced and reliable men including a competent leader can work with an interval of from 1 to 3 chain (67 - 200 ft.) between men and be reasonably certain that no concentrations of Ribes or single large Ribes bushes have been missed.

SUPPLEMENT NO. 1

DEVELOPMENT OF PRE-ERADICATION IN IDAHO

Since the eradication of the wild Ribes hosts of blister rust was first tried on an experimental basis, in the West, a constant effort has been made to find a satisfactory method of classifying areas into eradication types or classes. Such a classification is necessary because of the wide variation in methods and costs of eradication between the various forest types or eradication classes.

In the early stages of the eradication experiment experience and the data gotten from the work formed the only basis for a later type classification. The early types used were based on number of Ribes found, combined with the factor "working conditions." However, the classes could be determined only after the area has been worked by crews. It was evident that such a system would be of little value in attempting to forecast best methods suited to a given area and the probable cost of eradication.

The next step, then, in attempting to designate eradication type was based on timber types and age classes almost solely since it was felt that these did not vary greatly in working conditions and final cost of coverage by crews. In certain barren and swampy areas where no timber was present the conditions were recognized and eradication types based on conditions were established.

While this system was better than any previously used and, in general, could be applied to almost any area, certain weaknesses began to show. The chief of these was that within a given type, wide variations in Ribes present, working conditions, etc., resulted in widely varying methods and costs of eradication. Again, in different eradication types it was found that given types widely varying in timber, age, density etc., were worked by similar methods which resulted in similar costs per acre for different types. It could be seen that such a system of type classification could not be used as a basis for intelligent and accurate estimation of costs and methods.

Late in August of the present season, 1927, it was realized that a better and cheaper method must be found. This new system was developed and was used in the pre-eradication work on the area to be worked in 1928. The method is based on experience largely. Five eradication classes were recognized. These classes are based on methods now in use and involve no new ones. The following definitions apply;

Class A

Class A areas are worked by present extensive scout crews. Class A areas, those on which the conditions are such that a crew of 3 or 4 experienced and reliable men including a competent leader can work with an interval of from 1 to 3 chain (67 - 200 ft.) between men and be reasonably certain that no concentrations of Ribes or single large Ribes bushes have been missed.

In other words, this class includes areas of few Ribes, includes Dense Mature and Dense Pole timber and also other types where the method is applicable. An extensive scout crew of 3 or 4 men including foreman should cover 75 - 100 acres per day in Class A areas.

Class B

Class B areas would be worked by the same crew method except that the interval between men would be much less (25 - 67 ft.). This method is what is known as intensive scouting at present. Class B areas would include some Dense Mature and Pole, Dense Reproduction, partially barren areas, etc., where Ribes are sufficiently scattered and visibility so decreased that extensive scouting would not obtain satisfactory results. 15 - 25 acres are worked by a crew in a day.

Class C

Class C areas, while not usually including a very large percentage of acreage of a given area does require the greatest percentage of man days necessary to eradicate the whole given area. This has been the experience to date. Class C areas are those including much of the Dense Reproduction, Open Reproduction, Open Pole, Open Mature, etc., where Ribes are generally scattered throughout and the visibility is low with working conditions more or less severe. Either experienced or unexperienced men working in crew of 3 to 5 linemen and a foreman are used. It is the extensive regular crew method. The foreman checks behind the linemen. Linemen work at intervals of from 8 - 20 or 25 feet, moving ahead at a much slower speed than do scouts, and the whole crew covers 6 - 8 or 10 acres per day.

Class D

Class D areas are those generally called Stream Types. Many rapidly flowing streams and some meandering streams (where conditions do not approach Swamp) have narrow belts of brush and rather dense Ribes growth which require a crew working in very close formation (6 or 8 feet) and moving very slowly, covering 1 - 3 acres per day. The same crew as used on Class C is used here. A large part of each day is spent actually pulling bushes and very little time spent searching as on classes A, B, and C. Class D may also cover cutover or lightly broadcast burned over areas where Ribes have come in in such profusion that a crew can cover only 1 or 2 acres per day.

Class E

Class E area includes only swampy areas where brush and Ribes (petiolare and inermis in north Idaho) grow in great profusion. Experience has shown that a crew can cover only .1 - .25 of an acre per day in Class E and therefore such areas can be more cheaply and more effectively covered by chemical sprays providing a chemical can be found which will prove effective on inermis.

It is believed that the above classes can be very accurately applied to a given area by our present method of pre-eradication or erad-

Class B

Class A areas would be worked by the same crew methods except that the interval between men would be much less (25 - 67 ft.). This method is what is known as intensive scouting at present. Class B areas would include some Dense Mature and Pole, Dense Reproduction, partially barren areas, etc., where Mines are sufficiently scattered and visibility so decreased that extensive scouting would not obtain satisfactory results. 15 - 25 acres are worked by a crew in a day.

Class C

Class C areas, while not usually including a very large percentage of acreage of a given area does require the greatest percentage of man days necessary to eradicate the whole given area. This has been the experience to date. Class C areas are those including much of the Dense Reproduction, Open Reproduction, Open Pole, Open Mature, etc., where Mines are generally scattered thereabout and the visibility is low with working conditions more or less severe. Either experienced or unexperienced men working in crew of 3 to 5 linemen and a foreman are used. It is the extensive regular crew method. The foreman checks behind the linemen. Linemen work at intervals of from 8 - 30 or 25 feet, moving ahead at a much slower speed than do scouts, and the whole crew covers 6 - 8 or 10 acres per day.

Class D

Class D areas are those generally called Stream Types. Many really flowing streams and some meandering streams (where conditions do not approach Swamp) have narrow belts of brush and rather dense Mines growth which require a crew working in very close formation (6 or 8 feet) and moving very slowly, covering 1 - 3 acres per day. The same crew as used on Class C is used here. A large part of each day is spent methodically picking bushes and very little time spent searching as on classes A, B and C. Class D may also cover Gutover or lightly broadcast burned over areas where Mines have come in in much reduced numbers. One can cover only 1 or 4 acres per day.

Class E

Class E area includes only swampy areas where brush and Mines particularly and jarrig in north Idaho) area in great proportion. Experience has shown that a crew can cover only 1 - 25 of an acre per day in Class E and therefore such areas can be more cheaply and more effectively covered by chemical sprays providing a chemical can be found which will prove effective on Jarrig.

It is believed that the above classes can be very accurately applied to a given area by our present method of pre-eradication or eradi-

ication reconnaissance. This pre-eradication method has been use in a very extensive way in the past to get a general idea of the a. Later the strip method of reconnaissance to determine types and give data for map making, supplemented the extensive preliminary work.

During the present season it was found that the strip method o. pre-eradication was to expensive and bunglesome to apply. As a substitute this present method was evolved.

The present method includes two operations. In the first place, the region is mapped according to timber types and eradication classes by triangulation. Triangulation points are the highest peaks where ample and satisfactory views are obtained and their exact position can be found. Having found the exact position of these points, the plane table, alidade and other necessary equipment are used to make the map.

After completely mapping the area from enough points to give complete data, and also a check on mapping from other points, the area is gone over by experienced men who pass through all classes and types observing age of stand, density, fire scars, evidences of more than one burn, standing trees left by previous burn, etc., in an effort to check on the accuracy of the classification by planetable mapping. Where changes are needed, they are made.

In the end it is hoped that the method will prove most satisfactory as a pre-eradication method and become the standard method for use in forecasting or estimating the cost of any job in eradication of wild Ribes.

Cost of pre-eradication on 1928 area:

Acreage covered	10,043.0 acres
Cost of pre-eradication	$ 292.81
Average cost per acre	0.0291

data for map making, supplemented the extensive preliminary work.

During the present season it was found that the strip method o
pre-examination was so extensive and burdensome to apply. As a substitu
this present method was evolved.

The present method includes two operations. In the first plac
the region is mapped according to timber types and erosion classes
by triangulation. Triangulation points are the highest peaks where ample
and satisfactory views are obtained, and their exact position can be foun
Having found the exact position of these points, the plane table, alidade
and other necessary equipment are used to make the map.

After completely mapping the area from enough points to give
complete data, and also a check on mapping from other points, the area i
gone over by experienced men who pass through all classes and types
observing age of stand, density, fire scars, evidences of more than one
burn, standing trees left by previous burn, etc., in an effort to check
on the accuracy of the classification by plausible sampling. Where chan
are needed, they are made.

In the end it is hoped that the method will prove most satis-
factory as a pre-examination method and become the standard method for
use in forecasting or estimating the cost of any job in eradication of
wild fires.

Cost of pre-examination on 1926 area:

Average cost per acre 0.0291
Cost of pre-examination $ 323.81
Acreage covered 10,010.0 acres

SUPPLEMENT NO. 2

DETERMINATION OF PROPER TIME FOR ERADICATION OF RIBES AFTER LOGGING

The 1927 season saw the first large scale eradication on logged over areas in the Inland Empire. All such areas which were logged over ten years or more ago were reproducing very satisfactorily to white pine, most of the seed having come from seed trees or from storage in the duff. Likewise all such areas were supporting a heavy growth of Ribes.

It was observed that most of the Ribes growth resulted from duff disturbance either by the logging operation or by the brush disposal operation. On areas on which logging was done in 1925 or 1926 and the brush piled and burned in the fall of 1926 or spring of 1927 Ribes seedlings came in by the millions. It was not uncommon to find spots where there were at least 100 seedlings on 10 or 20 square feet. Seedlings come in wherever the soil has been disturbed or around the edge of areas where brush piles were burned. Practically no seedlings grew in the center of burned areas where burning was severe and thousands of them came in near the edge where burning was light. The same facts have been observed through ecology studies.

Obviously it is not feasible to attempt eradication on areas where the above condition exists.

On several occasions first and second year seedlings were found growing together along trails where soil was disturbed and along skidways. This indicates that eradication during the second year after logging or brush disposal would not be feasible since it is manifestly impossible to eradicate such small plants.

It is a well known fact that there is a heavy mortality among Ribes seedlings during their first and second year. This fact alone is sufficient reason for delaying eradication unless the prime purpose would be to destroy those plants which were on the area at the time of logging and would be producing new seeds yearly.

Considerable advance check strip work was done on several aged cuttings. Due to the large number of seedlings found on first and second year logged areas they will not be considered further. The data taken on advance strips and the check of such strips after eradication on third and fourth year cutting areas is shown in the following table.

The 1937 season saw the first large scale eradication on logged over areas in the Inland Empire. All such areas which were logged over ten years or more ago were reproducing very satisfactorily to white pine, most of the seed having come from seed trees or from storage in the duff. Likewise all such areas were supporting a heavy growth of Ribes.

It was observed that most of the Ribes growth resulted from duff disturbance either by the logging operation or by the brush disposal operation. On areas on which logging was done in 1935 or 1936 and the brush piled and burned in the fall of 1936 or spring of 1937 Ribes seedlings came in by the millions. It was not uncommon to find spots where there were at least 100 seedlings on 10 or 20 square feet. Seedlings came in wherever the soil bed been disturbed or around the edge of areas where brush piles were burned. Practically no seedlings grew in the center of burned areas where burning was severe and thousands of them came in near the edge where burning was light. The same facts have been observed through seedbed studies.

Obviously it is not feasible to attempt eradication on areas where the above condition exists.

On several occasions first and second year seedlings were found growing together along trails where soil was disturbed and along skidways. This indicates that eradication during the second year after logging or brush disposal would not be feasible since it is manifestly impossible to eradicate such small plants.

It is a well known fact that there is a heavy mortality among Ribes seedlings during their first and second year. This fact alone is sufficient reason for delaying eradication unless the prime purpose would be to destroy those plants which were on the area at the time of logging and would be reproducing new seeds yearly.

Considerable advance check strip work was done on several aged cuttings. Due to the large number of seedlings found on first and second year logged areas they will not be considered further. The data taken on advance strips and the check of such strips after eradication on third and fourth year cutting areas is shown in the following table.

TABLE NO. 1

1923-1924
Logging and Brush Disposal

Data by	Acreage	Number Bushes Over 6"	Over 12"	Total	Total Ft. L. S.
Advance Strip	4.85	608	1,273	1,881	5,421.0
Check	4.85	108	122	230	266.0
Pulling	4.85	500	1,151	1,651	5,155.0

General Efficieny based on No. bushes 87.8
" " " " ft. L. S. 95.1
Average feet of L.S. missed per acre 55
Average No. bushes " " " 47

While the average feet of live stem missed per acre is small most of it is represented by young and healthy bushes which have gotten a start and will probably make heavy growth in the future. The 47 bushes left per acre represents sufficient numbers of young plants to produce rather heavy Ribes growth.

In making conclusions it must be remembered that 1927 was the first year during which it was possible to experiment on logged over areas. It may be possible to devise a method for more effective working on young cutover areas beyond the Ribes seedling stage whereby better results could be gotten at a feasible cost. However, with the limited amount of data available it must be concluded that the safer course to pursue is to delay eradication at least until the fourth or fifth season after logging and brush disposal.

Table No. 1

1927-1928
Cutting and brush disposal

Date					
Advance					
Birch					
Cherry					
Maples					

General description based on No. plantes [illegible]

Average feet of L.S. missed per acre [illegible]

" No. beaches [illegible]

While the average feet of live stem missed per acre is small it is represented by young and healthy beaches which have gotten a start and will probably make heavy growth in the future. The 47 beaches left per acre represents sufficient numbers of young plants to produce rather heavy Biben growth.

In making conclusions it must be remembered that 1927 was the first year during which it was possible to experiment on logged over areas. It may be possible to devise a method for more effective working on young cutover areas beyond the Biben seedling stage whereby better results could be gotten at a feasible cost. However, with the limited amount of data available it must be concluded that the safer course to pursue is to delay eradication at least until the fourth or fifth season after logging and brush disposal.



W.704. Cutover and lightly broadcast burned about 1923. 10,000 Ribes per acre 2 and 3 years old.



W. 647. Stream type.

SUPPLEMENT NO. 3

CHECKING REPORT
by
P. S. Simcoe - Jr. Forester

I. Purpose of Checking

The checking work was performed for the purpose of analyzing the quality of the eradication work of different crews, and to make possible a study of the effect of different conditions on Ribes growth.

II. Location of Work

The checking work was done on the completed eradication areas in the drainage of the Little North Fork of the Coeur d'Alene River, northern Idaho.

III. Method of Work Employed

The check strip method, and the advance strip method with its subsequent check strip were used in sampling the eradication areas.

The check strip method consisted of recording data along one-rod strips, which were run by the use of compasses. These strips were run following the completion of the eradication blocks, and the missed bushes were recorded by height and live stem and were pulled. The records were totalled at the end of every two chains of strip (transects) and were kept separate according to the eradication types in which the bushes were found. Each of the transects was numbered to correspond with its place in the strip, and was classified according to the direction of exposure at that place.

The advance strips were essentially the same as the check strips except that they were run before eradication had been started on the areas. The data taken and the method of running them were practically the same but on the advance strips the bushes were left for the eradicators to pull, and the lines followed had to be so marked that they could be found again after the completion of the eradication work. This marking was accomplished by having the compass men mark on trees and other objects along their lines with colored lumber-crayon. Assurance that the transects on the checks on the advance strips, following eradication, would correspond with their locations on the advance strips was obtained by having the compass men fasten small strips of aluminum in conspicuous places at the ends of the two-chain transects. The colored markings were not too conspicuous, and the aluminum strips were hardly noticeable to anyone not looking for them so that this method seemed to be very successful. Each transect became one of a series of 1/20-acre plots.

SUPPLEMENT NO. 3

CHECKING REPORT

by

P. S. Simone - Jr. Forester

I. Purpose of Checking

The checking work was performed for the purpose of analyzing the quality of the eradication work of different crews, and to make possible a study of the effect of different conditions on Ribes growth.

II. Location of Work

The checking work was done on the completed eradication areas in the drainage of the Little North Fork of the Coeur d'Alene River, northern Idaho.

III. Method of Work Employed

The check strip method, and the advance strip method with its subsequent check strip were used in sampling the eradication areas.

The check strip method consisted of recording data along one-rod strips, which were run by the use of compasses. These strips were run following the completion of the eradication blocks, and the missed bushes were recorded by height and live stem and were pulled. The records were totalled at the end of every two chains of strip (transects) and were kept separate according to the eradication types in which the bushes were found. Each of the transects was numbered to correspond with its place in the strip, and was classified according to the direction of exposure at that place.

The advance strips were essentially the same as the check strip except that they were run before eradication had been started on the areas. The data taken and the method of running them were practically the same but on the advance strips the bushes were left for the eradicators to pull, and the lines followed had to be so marked that they could be found again after the completion of the eradication work. This marking was accomplished by having the compass men mark on trees and other objects along their lines with colored lumber-crayon. Assurance that the transects on the checks on the advance strips, following eradication, would correspond with their locations on the advance strips was obtained by having the compass men fasten small strips of aluminum in conspicuous places at the ends of the two-chain transects. The colored markings were not too conspicuous, and the aluminum strips were hardly noticeable to anyone not looking for them so that this method seemed to be very successful. Each transect became one of a series of 1/20-acre plots.



W. 636. Swamp type. 1927 eradication area.



W. 609. Crew at work in open reproduction type -- 1927.

The three-man crew seemed to be the best formation for carrying on the checking work, and the six checkers were used to form two such crews. Each crew checked two camps and the fifth camp was checked by either of the two crews as opportunity offered. Camp #5 was checked by the strip method entirely and four-man crews were often used in carrying on these checks.

The reason the advance strip method was used was because the advance plot method formerly used, although it gave a very good check, had to be changed so that the location of the plots would become automatic. The location of plots where Ribes were plentiful was the old method. With the advance strip method the plots are in series and are located only along the compass courses, which are determined before the strips are run, by consulting type maps of the blocks to be checked. Time in laying out the plots is saved by using the advance strip method, since no natural boundaries are necessary in locating them.

Since two per cent of close formation eradication work and one-half of one per cent of scout work was agreed upon as being the necessary amount of areas to be checked, and since we were unable to cover the necessary acreage with the advance strips, the check strips were used to bring the checked areas, in each type, up to the necessary quantities. This was our aim at least.

IV. Work Performed

Nearly all of the eradicated areas were checked. In addition to the checking work performed it was possible, by taking some additional data, to make several ecological studies. Studies were made to show the effect of slope on Ribes growth. This study was made possible by the methods of checking, which afforded these data at no increase in cost of checking.

The total number of advance plots studied was 2,475.

The total number of advance plots studied and checked was 912.

The total number of acres in the check strips for the season was 173.2.

The bush with the average amount of live stem was determined for each eradication type to assist in computing the amount of live stem pulled by the crews. This information was also taken from the advance strip records.

The sites of missed Ribes were studied, and classified according to the importance of each.

The three-man crew seemed to be the best formation for carrying on the checking work, and the six checkers were used to form two such crews. Each crew checked two camps and the fifth camp was checked by either of the two crews as opportunity offered. Camp #5 was checked by the strip method entirely and four-man crews were often used in carrying on these checks.

The reason the advance strip method was used was because the advance plot method formerly used, although it gave a very good check, had to be changed so that the location of the plots would become automatic. The location of plots where Ribes were plentiful was the old method. With the advance strip method the plots are in series and are located only along the compass courses, which are determined before the strips are run, by consulting type maps of the blocks to be checked. Time in laying out the plots is saved by using the advance strip method, since no natural boundaries are necessary in locating them.

Since two per cent of close formation eradication work and one-half of one per cent of scout work was agreed upon as being the necessary amounts of areas to be checked, and since we were unable to cover the necessary acreage with the advance strips, the check strips were used to bring the checked areas, in each type, up to the necessary quantities. This was our aim at least.

IV. Work Performed

Nearly all of the eradicated areas were checked. In addition to the checking work performed it was possible, by taking some additional data, to make several ecological studies. Studies were made to show the effect of slope on Ribes growth. This study was made possible by the methods of checking, which afforded these data at no increase in cost of checking.

The total number of advance plots studied was 3,475.

The total number of advance plots studied and checked was 91[illegible]

The total number of acres in the check strips for the season was 173.2.

The bush with the average amount of live stem was determined for each eradication type to assist in computing the amount of live stem pulled by the crews. This information was also taken from the advance strip records.

The sites of missed Ribes were studied, and classified according to the importance of each.

V. Results Obtained

Efficiency of Eradication -- 1927

The efficiency figures for each type, and for all types at each camp, and for all camps, were obtained. Table 1 is a general summary showing efficiency of all work performed.

Dense Mature	19.6	29.					
Open Mature	24.8	24.4					
Dense Pole		3.1					2
Open Pole	8.2	2.7					2
Dense Repro	40.9	63.5		470.6	1.	.2	1
Cut-over	356.3	74.5	2,381.6	298.9			89.6
Stream	360.2	89.5	7,416.9	86.8	2.4	80.1	94.8
All Types	85.2	31.8	1,123.8	333.8	1.1	78.8	77.1

1927 Annual Report
C. C. Strong

V. Results Obtained

TABLE NO. 1

Efficiency of Eradication -- 1927

Northern Idaho

Type	Bushes Per Acre		Live Stem Per Acre		Per Cent of Type Checked	Efficiency of Erad.	
	Pulled	Missed	Pulled	Missed		By Number	By Live Stem
Camp #1							
Dense Mature	11.0	3.1	338.6	78.6	4.8	78.0	78.5
Open Mature	14.2	5.6	380.5	71.4	0.6	71.7	79.9
Dense Pole	48.6	1.9	1,551.7	52.6	0.6	96.2	96.7
Open Pole	100.6	1.9	1,136.1	35.6	2.8	98.1	97.8
Dense Repro.	24.4	4.0	1,187.1	71.6	0.7	85.9	94.3
Open Repro.	118.6	19.9	2,284.9	145.2	2.5	85.6	94.1
Cut-over	52.4	5.2	1,205.9	71.0	2.0	90.9	94.4
Stream	735.7	37.9	29,126.7	431.6	2.0	95.0	98.5
All Types	61.6	8.5	3,584.4	107.7	1.1	90.4	97.1
Camp #2							
Dense Mature	41.0	5.0	846.7	70.0	0.3	89.1	92.4
Open Mature	146.5	21.0	5,008.0	148.0	1.6	87.5	95.3
Dense Pole	40.8	16.2	760.0	88.3	0.1	71.4	95.8
Dense Repro.	110.4	26.8	1,395.7	135.0	2.3	80.5	92.6
Open Repro.	264.4	27.4	1,572.8	92.7	0.7	89.5	94.4
Cut-over	248.3	137.9	2,128.2	172.7	3.5	59.7	92.5
Stream	933.3	156.1	5,594.5	398.2	1.7	85.7	93.4
All Types	248.2	57.9	2,588.2	169.0	1.6	80.7	93.9
Camp #3							
Dense Mature	27.1	0.0	337.1	0.0	0.1	100.0	100.0
Open Mature	47.6	12.5	720.0	142.6	0.8	79.2	83.5
Dense Pole	72.6	7.1	4,387.5	191.0	1.4	91.1	96.3
Open Pole	118.5	6.3	1,538.6	54.1	1.7	94.7	96.6
Open Repro.	214.5	31.5	1,504.3	39.3	16.5	87.2	97.5
Cut-over	422.1	42.0	273.6	6.3	1.4	91.0	97.7
Stream	966.8	78.7	8,047.9	356.4	2.4	87.5	95.9
All Types	309.8	25.6	1,731.7	81.6	1.3	90.0	95.5
Camp #4							
Dense Mature	6.7	3.3	418.6	118.3	2.3	58.0	77.9
Open Mature	58.0	24.6	952.6	226.4	1.3	70.2	80.7
Open Pole	370.0	30.0	1,770.0	240.0	16.6	94.9	88.1
Cut-over	235.0	116.0	1,858.5	438.6	1.8	66.9	79.1
Stream	829.7	110.2	14,307.4	456.9	3.4	88.3	96.9
All Types	106.9	35.1	1,122.5	209.1	1.5	75.3	84.3
Camp #5 (Scout Camp)							
Dense Mature	19.6	29.4	197.2	149.4	0.9	40.0	57.2
Open Mature	24.8	24.4	978.0	252.5	2.2	50.4	79.4
Dense Pole	11.0	3.1	816.1	200.7	1.5	78.0	61.2
Open Pole	8.2	2.7	648.2	416.1	0.3	75.2	60.9
Dense Repro.	40.9	63.5	355.4	470.0	1.7	39.2	43.1
Cut-over	356.3	74.5	2,481.6	238.9	0.6	82.7	89.6
Stream	360.2	89.5	7,416.9	406.8	2.4	80.1	94.8
All Types	85.2	31.8	1,128.8	333.8	1.1	72.8	77.1
Average for all Camps (except Camp #5)							
Dense Mature	18.6	3.7	338.1	84.1	2.0	78.5	82.0
Open Mature	80.0	18.8	1,351.0	148.9	1.1	82.4	89.3
Dense Pole	56.6	5.8	736.8	81.5	0.7	90.7	95.9
Open Pole	313.1	11.4	999.1	75.2	7.3	94.9	93.0
Dense Repro.	58.2	14.2	901.2	104.6	1.5	80.4	89.6
Open Repro.	252.9	30.3	2,754.8	85.2	6.6	89.3	97.0
Cut-over	250.3	56.0	2,287.2	174.8	2.4	81.7	92.9
Stream	855.8	97.7	12,956.1	428.3	2.4	87.2	96.8
All Types	249.2	38.9	3,389.2	179.0	1.4	86.5	95.6

1927 Annual Report
C. C. Strong

The effects of direction of exposure, and of eradication type conditions on Ribes growth were studied by using the data from the advance strips. The live stem averages were weighted by the number of bushes in each live stem class.

TABLE NO. 2

Slope	Bush of Average Live Stem	
	R. lacustre	R. viscosissimum
NE	21.15 feet	5.55 feet
E	10.47 feet	4.17 feet
SE	15.82 feet	8.98 feet
S	12.93 feet	18.24 feet
SW	8.39 feet	4.80 feet
W	10.73 feet	2.66 feet
NW	13.44 feet	3.12 feet
N	13.80 feet	3.13 feet

Type	Bush of Average Live Stem	
	R. lacustre	R. viscosissimum
DM	20.65 feet	4.20 feet
DP	16.73 feet	1.65 feet
DR	15.42 feet	2.00 feet
OM	14.36 feet	13.90 feet
OP	4.79 feet	3.94 feet
OR	11.12 feet	3.86 feet
CC	8.38 feet	4.11 feet
Str.	19.69 feet	--

The following illustrations show graphically the effect of slope and type on number and size of bushes of each species.

The effects of direction of exposure, and of orientation type conditions on Ribes growth were studied by using the data from the advance strip. The live stem averages were weighted by the number of bushes in each live stem class.

TABLE NO. 2

Slope	Basal of Average Live Stem	
	P. laevaeta	P. viscosissimum
NE	21.15 feet	5.35 feet
E	10.47 feet	4.17 feet
SE	15.83	
SE	18.82 feet	8.38 feet
S	13.88 feet	18.24 feet
SW	8.39 feet	4.80 feet
W	10.78 feet	3.66 feet
NW	13.44 feet	3.18 feet
N	13.80 feet	3.13 feet

Type	Basal of Average Live Stem	
	P. laevaeta	P. viscosissimum
NE	30.65 feet	4.80 feet
E	16.78 feet	1.65 feet
SE	15.42 feet	8.00 feet
S	14.86 feet	16.36 feet
SW	4.78 feet	2.84 feet
W	11.18 feet	4.86 feet
NW	4.39 feet	4.11 feet
N	13.89 feet	

The following illustrations show graphically the effect of slope and type on number and size of bushes of each species.

The figures showing average size of bushes were the ones used in computing the total amount of live stem pulled by the crews. The average bush was found by dividing the total amount of live stem on each exposure or type by the total numbers found there on advance stripe.

VI. Site of Missed Ribes

A careful study has been made of those sites where Ribes are most frequently missed. The results of such studies are of much benefit to the eradication crews in that they can exercise special care while covering such sites. The results of studies on site of missed Ribes are shown in table 3.

Acknowledgement

Special acknowledgement is accorded to the Tinton Lumber Company officials who very generously permitted the free use of a storage warehouse at Honeysuckle and of the buildings and equipment at one of the logging camps of the company.

Acknowledgement

Special acknowledgement is accorded to the Hinton Lumber Company officials who very generously permitted the free use of a storage warehouse at Honeysuckle and of the buildings and equipment at one of the logging camps of the company.

TABLE NO. 3

Site of Ribes

Per Cent of Total Number of Bushes on the Area Found on Each Site

Site	D. M.	D. P.	D. R.	C. M.	C. P.	C. R.	C. C.
Dry draws	--	--	--	1.17	--	1.08	1.45
Windfalls, under or behind	17.39	9.38	39.78	20.60	9.88	29.84	18.81
Decayed stumps or logs	8.69	4.69	4.40	7.44	--	2.15	2.99
Decaying branches (branch mulch)	4.35	12.50	0.55	4.15	--	2.15	2.56
Raised ground adjacent to mature trees	4.35	--	2.20	5.93	7.41	0.54	3.79
On creek banks	4.83	--	--	2.82	--	0.27	1.29
Upturns(root systems of trees and resultant cavities)	13.91	--	7.73	12.29	7.41	2.96	4.73
Openings in timber	22.26	1.56	5.59	13.00	38.26	15.83	30.43
Damp slopes	3.76	50.00	8.30	4.54	--	1.34	2.91
Alder bottoms	--	14.06	--	3.60	--	0.27	--
Rock outcrops	--	--	0.55	1.10	9.88	2.96	0.81
Dense brush	14.49	7.81	32.60	25.37	27.16	40.59	33.43
Totals	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Relation of Ribes to Adjacent Brush (percentage as above)

Hidden by brush	4.83	4.69	9.39	20.91	14.82	19.09	21.23
Partially hidden	20.77	12.50	49.72	26.70	25.46	35.48	34.05
Visible above brush	20.77	6.25	20.99	19.34	17.28	15.94	24.78
No brush near Ribes	53.63	76.56	19.90	33.05	44.44	28.49	29.94
Totals	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Per Cent of Total Number of Missed Bushes on the Area Missed on Each Site

Site	D. M.	D. P.	D. R.	C. M.	C. P.	C. R.	C. C.
Dry draws	--	--	--	0.96	--	0.57	0.64
Windfalls, under or behind	10.09	25.37	41.94	14.54	13.11	27.58	13.08
Decayed stumps or logs	8.65	5.47	3.23	6.16	--	4.60	3.33
Decaying branches (branch mulch)	5.76	2.99	1.38	4.35	--	1.72	2.15
Raised ground adjacent to mature trees	3.75	--	0.92	5.84	6.56	3.45	5.50
On creek banks	0.86	--	--	1.38	--	--	1.85
Upturns(root systems of trees and resultant cavities)	33.72	--	8.29	11.04	8.30	10.92	7.71
Openings in timber	15.85	14.93	2.31	15.88	40.98	12.09	18.56
Damp slopes	5.75	10.95	8.29	9.13	--	3.45	9.08
Alder bottoms	--	13.91	--	3.18	--	0.57	--
Rock outcrops	--	--	--	1.17	1.64	--	0.72
Dense brush	13.26	23.38	32.26	23.25	29.51	34.48	36.80
Covered by pulled Ribes	2.30	--	1.38	2.13	--	0.57	1.08
Totals	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Relation of Missed Ribes to Adjacent Brush (percentage as above)

Hidden by brush	1.73	6.97	5.99	12.21	9.84	18.97	14.34
Partially hidden	12.97	24.88	47.47	26.22	18.02	36.78	35.30
Visible above brush	17.58	16.92	22.12	17.83	18.02	12.07	[illegible]
No brush near Ribes	67.72	51.23	24.72	43.74	54.10	32.18	43.74
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Efficiency of Eradication, by Number of Bushes on Each Site

Site	% Efficiency
Dry draws	58.54
Windfalls, under or behind	64.34
Decayed stumps or logs	67.72
Decaying branches (branch mulch)	58.[illegible]
Raised ground adjacent to mature trees	68.43
On creek banks	58.30
Upturns (root systems of trees and resultant cavities)	71.[illegible]
Openings in timber	72.[illegible]
Damp slopes	72.[illegible]
Alder bottoms	81.87
Rock outcrops	88.24

1927 Annual Report
C. C. Strong

CONTROL RECONNAISSANCE, IDAHO

by

J. L. Bedwell
Assistant Pathologist

I. Definition and Purpose of Work

A rapid and systematic survey of the white pine region to determine:

1. The extent and distribution of white pine types, and
2. The factors influencing the cost and methods of eradicating Ribes thereon.

II. Methods of Work

A. Field Method:

The areas covered by reconnaissance on the several associations and national forests were worked by the same standardized methods. Part of each area was worked intensively and part extensively. The intensive areas were typed and plots were taken every ten chains (two to the forty) on a strip run through the center of each forty, whereas the extensive areas were typed only, no plots being taken.

The proportion of intensive to extensive work was much higher on the association lands than on the lands within the National forests, since the cooperative agencies desired more of their land to be covered by the intensive method. The general division of areas into intensive and extensive work on association lands was on the basis of a checkerboard or alternate sections, but there was some deviation from this due to the occurrence or absence of white pine on the section designated for a particular class of work.

Details of the methods employed are shown in the following instructions for control reconnaissance, a copy of which was furnished each chief of party for his guidance. Samples of the field map sheet, field note sheets, and field section summary sheets are enclosed.

"INSTRUCTIONS FOR PERFORMING CONTROL RECONNAISSANCE

"I. Purpose:

"The purpose of control reconnaissance is to make a rapid and

COEUR D'ALENE RECONNAISSANCE, IDAHO

by

J. L. Bedwell
Assistant Pathologist

I. Definition and Purpose of Work

A rapid and systematic survey of the white pine region to determine:

1. The extent and distribution of white pine types, and
2. The factors influencing the cost and methods of eradicating Ribes thereon.

II. Methods of Work

A. Field Method:

The areas covered by reconnaissance on the several associations and national forests were worked by the same standardized methods. Part of each area was worked intensively and part extensively. The intensive areas were typed and plots were taken every ten chains (two to the forty) on a strip run through the center of each forty, whereas the extensive areas were typed only, no plots being taken.

The proportion of intensive to extensive work was much higher on the association lands than on the lands within the National Forests, since the cooperative agencies desired more of their land to be covered by the intensive method. The general division of areas into intensive & extensive work on association lands was on the basis of a checkerboard or alternate sections, but there was some deviation from this due to the occurrence or absence of white pine on the section designated for a particular class of work.

Details of the methods employed are shown in the following instructions for control reconnaissance, a copy of which was furnished each chief of party for his guidance. Samples of the field map sheet, field note sheets, and field section summary sheets are enclosed.

"INSTRUCTIONS FOR PERFORMING CONTROL RECONNAISSANCE

"I. Purpose:

"The purpose of control reconnaissance is [illegible]

systematic survey of the white pine region to determine (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

"II. Methods:

"In brief, the method of performing control reconnaissance is as follows: Each man works a section alone, under the supervision of the Chief of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of sample plots.

"The actual details of work may be considered in 3 steps: (1) The division of a section into eradication types, timber types and timber age classes; (2) obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form.

"A. Typing: The section and such areas adjacent thereto as can be readily and accurately seen will be covered in such manner that all types will be sketched in and properly designated as to eradication type, timber type, and timber age class. This shall be done by the following method:

"The mapper will cover the section by starting at a section corner, offsetting 10 chains in a cardinal direction along the section line and then running a strip in a cardinal direction through the section. Plots will be taken 5 chains inside the section from the section line and every 10 chains thereafter making 8 plots to the strip or 2 plots per 40. At the section line a tie will be made to a section corner or 1/4 corner at the discretion of the mapper. A return strip will be run in the direction opposite to and paralleling that of the first strip 20 chains from the first strip, taking plots as before. A tie will be made at the end of this strip as before.

"Strips will be run so as to cross topography in order to encounter Ribes conditions.

"Distances will be measured by pacing and directions taken by box compass.

"Designation of types: The standard classification of forest types as used by the Forest Service will be used. A copy of definitions of these types accompanies these instructions.

"The age class of a timber stand will be that age class which will next be logged. The following timber age classes will be recognized:

systematic survey of the white pine region to determine (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of creating Mines thereon.

"II. Methods:

"In brief, the method of performing control reconnaissance is as follows: Each man works a section alone, under the supervision of the Chief of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of sample plots.

"The actual details of work may be considered in 3 steps: (1) The division of a section into cruising types, timber types and timber age classes; (2) obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form. Cruising Instructions

"A. Typing: The section and such areas adjacent thereto as can be readily and accurately seen will be covered in such manner that all types will be sketched in and properly designated as to eradication type, timber type, and timber age class. This shall be done by the following method:

"The mapper will cover the section by starting at a section corner of meeting 1.0 chains in a cardinal direction along the section line and then running a strip in a cardinal direction through the section. Flagging will be taken 5 chains inside the section from the section line and every 10 chains thereafter running 8 plots to the strip or 2 plots per 40. At the section line a tie will be made to a section corner or 1/4 corner as the direction of the mapper. A return strip will be run in the direction opposite to and parallelling that of the first strip 20 chains from the first strip, making plots as before. A tie will be made at the end of this strip as before.

"Strips will be run so as to cross topography in order to encounter Mines conditions.

"Distances will be measured by pacing and directions taken by box compass.

"Description of types: The standard classification of forest types as used by the Forest Service will be used. A copy of definitions of these types accompanies these instructions.

"The age class of a timber stand will be that age class which will most be logged. The following timber age classes will be recognized:

1 - 10 years
11 - 20 years
21 - 40 years
41 - 60 years
61 - 80 years
81 - 100 years
101 - 200 years
200+ years

"An eradication type is an area on which eradication working conditions are similar. There will be eight eradication types defined as follows:

"1. Dense Mature (D.M.) A stand of timber 12" D.B.H., or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist spots.

"2. Open Mature (O.M.) A stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

"3. Dense Pole (D.P.) A stand in which the trees next to be cut are predominatly 6" to 12" D.B.H., which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

"4. Open Pole (O.P.) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H., which is understocked, this condition generally resulting in the presence of brush and Ribes.

"5. Dense Reproduction (D.R.) A stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

"6. Open Reproduction (O.R.) A stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes, if other conditions are favorable.

"7. Stream type (St.) An area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

"8. Brush (Br.) An area either cut or burned over or of waste land on which reproduction has not yet occurred, but on which Ribes may occur contiguous to white pine type.

"Timber data on each type, except stream type, will be taken on one man sample plots. Thesewill be circular plots of 37-foot radius equalling 1/10 of an acre. Ribes data will be obtained by a strip

1 - 10 years
11 - 20 years
21 - 40 years
41 - 80 years
81 - 120 years
121 - 200 years
200+ years

"An eradication type is an area on which eradication working conditions are similar. There will be eight eradication types defined as follows:

"1. Dense Mature (D.M.) A stand of timber 12" D.B.H., or over, which is fully stocked or nearly so, and generally, but not necessarily containing little brush and few Ribes, except in openings or moist spots.

"2. Open Mature (O.M.) A stand of timber 12" D.B.H., or over, which is unstocked, this condition generally resulting in the presence of brush and Ribes.

"3. Dense Pole (D.P.) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H., which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

"4. Open Pole (O.P.) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H., which is understocked, this condition generally resulting in the presence of brush and Ribes.

"5. Dense Reproduction (D.R.) A stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

"6. Open Reproduction (O.R.) A stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches over the ground, the intervening openings generally containing brush and Ribes, if other conditions are favorable.

"7. Stream Type (St.) An area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

"8. Burn (Bn.) An area either cut or burned over or of waste land on which reproduction has not yet occurred, but on which Ribes may occur sometime to white pine type.

"Timber data on each type, except stream type, will be taken on one man sample plots. These will be circular plots of 37-foot radius equalling 1/10 of an acre. Ribes data will be obtained by a strip

"plot 1 rod wide and 4 chains long equalling 1/10 of an acre. This latter plot will start from the center of the circular timber plot and run in the direction of the next plot to be taken. The location of each sample plot should be indicated by a small circle on the map and numbered consecutively 1 - 32, corresponding to its number on the note sheet.

"On stream type only Ribes data will be taken omitting timber data. When a stream having stream type is crossed on the line two 1/10 acre plots will be taken. These plots should be taken down stream from the line in every case. Stream type plots to be numbered consecutively independent of the sample plot numbers.

"A detailed explanation of the forms for recording data is omitted here, because the forms are self explanatory.

"III. Duties and Responsibilities of Chiefs of Party:

"1. Designating sections to be worked by each man.

"2. Checking the work and seeing that all field work is in completed form and that maps are jibed each evening.

"3. Directly responsible to field supervisor for all phases of the work and will take instructions from him either oral or written.

"4. Planning work and camp locations so as to minimize lost motion and time in moving camps.

"5. On rainy days he will have his men summarize in completed form such work as the time permits.

"REMEMBER

"Data taken on plots MUST be accurate.

"Type lines should be located as accurately as possible.

"The radius of plots taken on slopes must be extended up and down the slope to the same degree that pacing is extended in order allow for horizontal distance.

"The tendency to shorten the radius is greater in dense stands.

"The reconnaissance man should make a study of types: - those differences in degree of slope, aspect, soil, elevation, moisture content, etc., that affect change in type, so that by

"The reconnaissance man should make a study of types - these differences in degree of slope, aspect, soil, elevation, moisture content, etc., that affect change in type, so that by

stands.

"The tendency to shorten the reding is greater in dense

allow for horizontal distance.

down the slope to the same degree that pacing is extended in order

"The reding of plots taken on slopes must be extended up and

"Type lines should be located as accurately as possible.

"Data taken on plots MUST be accurate.

"ACCURACY

form such work as the time permits.

"5. On rainy days he will have his men summarize in completed

motion and time in moving camps.

"4. Planning work and camp locations so as to minimize lost

the work and will take instructions from him either oral or written.

"3. Directly responsible to field supervisor for all phases of

completed form and that maps are filled each evening.

"2. Checking the work and seeing that all field work is in

"1. Designating sections to be worked by each man.

"III. Duties and Responsibilities of Chiefs of Party:

here, because the forms are self explanatory.

"A detailed explanation of the forms for recording data is omitt

independent of the sample plot numbers.

the line in every case. Stream type plots to be numbered consecutively

acre plots will be taken. These plots should be taken down stream from

date. When a stream having stream type is crossed on the line two 1/10

"On stream type only Ribes data will be taken omitting timber

and numbered consecutively 1 - 32, corresponding to its number on the note sheet.

of each sample plot should be indicated by a small circle on the map

and run in the direction of the next plot to be taken. The location

latter plot will start from the center of the circular timber plot

"plot 1 rod wide and 4 chains long equalling 1/10 of an acre. This

observing the lay of the land, he can intelligently connect up the type boundaries between strips.

"This mapping of types is very important, because if we propose to figure out an acre average for a certain type or age class, we must know the approximate acreage to which to apply it.

"Remember: No work in the field, however well done, is of any worth, unless it is recorded in a form that can be readily interpreted by someone else, and it is best to reckon this "someone else" as being much more stupid than yourself."

(a) Differences in methods over those of last year.

The same methods were followed as were used last year with the exception of the taking of plots. The same number of plots were taken each year on a section but this year the plots were taken every ten chains on a strip run through the center of each 40, whereas last year the plots were taken on a traverse within each type. This strip system is the universal method and leaves the least amount to the judgment of the field man. The strip method will be used in future work.

B. Office Method:

1. Compilation of data.

A standardized system has been devised for the keeping, in a permanent record form, of all reconnaissance data and maps. The map sheets and data sheets are approximately 14" x 19" and are kept in lock type post binders, indexed by township and range. In a given township and range the township ownership map, reconnaissance map and the reconnaissance data sheets are together for handy reference.

Compilation of the reconnaissance data consists simply in copying the field section summary if properly computed.

The ownership map is prepared from records obtained from the various county recorder's offices and was brought up to date as of December 31, 1926.

2. Preparation of permanent reconnaissance maps

As mentioned above the permanent maps are recorded on a township map and filed in a post binder by township and range. The method of preparation of these maps is covered in the following instructions, a copy of which is furnished to each permanent reconnaissance man:

observing the lay of the land, he can intelligently convert by the type boundaries between strips.

"This mapping of types is very important, because if we propose to figure out an acre average for a certain type or map class, we must know the approximate acreage to which to apply it.

"Remember: We work in the field, however well done, is of any worth, unless it is recorded in a form that can be readily interpreted by someone else, and it is best to reckon this "someone else" as being much more stupid than yourself."

(g) Differences in methods over those of last year.

The same methods were followed as were used last year with the exception of the taking of plots. The same number of plots were taken each year on a section but this year the plots were taken every ten chains on a strip run through the center of each 40, whereas last year the plots were taken on a traverse within each type. This strip system is the universal method and leaves the least amount to the judgment of the field man. The strip method will be used in future work.

5. Office method:

1. Compilation of data.

A standardized system has been devised for the keeping, in a permanent record form, of all reconnaissance data and maps. The map sheets and data sheets are approximately 14" x 17" and are kept in lock type post binders, indexed by township and range. In a given township and range the township ownership map, reconnaissance map and the reconnaissance data sheets are together for handy reference.

Compilation of the reconnaissance data consists simply in copying the field section summary if properly completed.

The ownership map is prepared from records obtained from the various county recorder's offices and was brought up to date as of December 31, 1936.

2. Preparation of permanent reconnaissance maps

As mentioned above the permanent maps are recorded on a township map and filed in a post binder by township and range. The method of preparation of these maps is covered in the following instructions, a copy of which is furnished to each permanent reconnaissance man:

"PERMANENT MAPS OF RECONNAISSANCE WORK

"A. Intensive Reconnaissance

"I. Type Designations:

"Designations should agree with those used in mapping types in the field. These should consist of (1) the abbreviated form of the eradication type (2) the timber type with white pine stated first (when it is a white pine type) and the associated species in order of their predominance, and (3) age class of the stand. Type designations shall be written with Higgins Carmine waterproof ink.

"II. Type Lines:

"Type lines, including stream type, shall be dotted lines made with Higgins Carmine waterproof ink.

"III. Color Legend for Eradication Types:

"The following Dixon colored crayons shall be used for coloring white pine eradication types:

Type	Color	Dixons Best No.
1. D.M.	Yellow	353
2. O.M.	Green	354
3. D.P.	Orange	324
4. O.P.	Blue	350
5. D.R.	Brown	335
6. O.R.	Violet	323
7. St.	Red	321½

"Meadows, rock type, burns, etc., will be designated but not colored. Timber types other than white pine will be designated but not colored.

"These colors should be applied lightly and evenly and then dry rubbed with clean cheesecloth wrapped over a finger or pencil.

"IV. Ribes and Acreage Fraction:

"For each eradication type in each section indicate by means of a fraction the number of acres of that type in that section and the average number of Ribes per acre on that type for that section. Let the numerator represent the acres and the denominator the Ribes.

"A. Interpretive Instructions

"I. Type Designations:

"Designations should agree with those used in mapping types in the field. These should consist of (1) the abbreviated form of the erudition type (2) the timber type with white pine stated first (when it is a white pine type) and the associated species in order of their predominance, and (3) age class of the stand. Type designations shall be written with Higgins Carmine waterproof ink.

"II. Type Lines:

"Type lines, indicating stream type, shall be dotted lines made with Higgins Carmine waterproof ink.

"III. Color Legend for Erudition Types:

"The following Dixon colored crayons shall be used for coloring white pine erudition types:

Type	Color	Dixons Best No.
1. D.M.	Yellow	383
2. O.M.	Green	384
3. I.T.	Green	384
4. W.T.	Blue	380
5. D.H.	Brown	382
6. O.H.	Violet	382
7. St.	Red	382½

"Meadows, rock type, burns, etc., will be designated but not colored. Timber types other than white pine will be designated but not colored.

"These colors should be applied lightly and evenly and then dry rubbed with clean cheesecloth wrapped over a finger or pencil.

"IV. Plane and Surface Erudition:

"For each erudition type in each section indicate by means of a fraction the number of acres of that type in that section and the average number of miles per acre or that type for that section. Let the numerator represent the acres and the denominator the miles.

"V. Cultural Features:

"Streams shall be inked with Higgins Indigo blue waterproof ink.

"Roads, trails, railroads, telephone lines, buildings, names of streams and other cultural features shall be shown with Higgins waterproof black ink.

"Type lines, type designations, streams, cultural features, acre-Ribes fractions, etc. shall all be entered on the map before the eradication type colors are applied.

"B. Extensive Reconnaissance

"Type lines, type designations, and cultural features shall be shown exactly as in mapping intensive work. Acre-Ribes fraction shall be the same with the Ribes figure a blank.

"Colors for eradication types shall be the same as in intensive but the colors shall be in horizontal cross hachures instead of in solid color. An exception to this will be stream type which will necessarily have to be solid color as in intensive work."

C. Personnel:

The permanent personnel consisted of the project supervisor, J. L. Bedwell, his assistant, M. C. Riley and the five association men, viz: W. F. Painter, Clearwater Association; G. M. Whiting, Coeur d'Alene Association; H. F. Geil, Pend Oreille Association; R. E. Myers, Potlatch Association; and H. L. Whiting, Priest Lake Association. The project supervisor gave most of his attention to the association work with general supervision to the work on lands inside the national forests. Mr. Riley devoted most of his time to supervision of work on the national forests but spent considerable time on the supervision of field work on private lands.

The temporary personnel, employed for the field season only, consisted of forestry students who were picked for this work because of special training and aptitude. The total of thirty-three temporary men were distributed among the several associations and forests as follows: Clearwater Association; three; Coeur d'Alene Association, two; Pend Oreille Association, six; Potlatch Association, three; Priest Lake Association, four; Kaniksu National Forest, three; Pend Oreille National Forest, three; and on the St. Joe National Forest, nine.

"V. Cultural Features:

"Streams shall be inked with dripping Indigo Blue waterproof ink.

"Roads, trails, railroads, telephone lines, buildings, names of streams and other cultural features shall be shown with Dripping waterproof Black ink.

"Type lines, type designations, streams, cultural features, core-Ribes fractions, etc. shall all be entered on the map before the erodication type colors are applied.

"3. Extensive Reconnaissance

"Type lines, type designations, and cultural feature shall be shown exactly as in mapping intensive work. Acre-Ribes fraction shall be the same with the Ribes figure a blank.

"Colors for eradication types shall be the same as in intensive but the colors shall be in horizontal cross hachures instead of in solid color. An exception to this will be stream type which will necessarily have to be solid color as in intensive work."

C. Personnel:

The permanent personnel consisted of the project supervisor, J. L. Bedwell, his assistant, M. C. Riley and the five association men, viz: W. T. Painter, Clearwater Association; E. M. Whiting, Coeur d'Alene Association; H. T. C-il, Pend Oreille Association; E. E. Myers, Potlatch Association; and H. L. Whiting, Priest Lake Association. The project supervisor gave most of his attention to the association work with general supervision to the work on lands inside the national forests. Mr. Riley devoted most of his time to supervision of work on the national forests but spent considerable time on the supervision of field work on private lands.

The temporary personnel, employed for the field season only, consisted of forestry students who were picked for this work because of special training and aptitude. The total of thirty-three temporary men were distributed among the several associations and forests as follows: Clearwater Association; Three; Coeur d'Alene Association, two; Pend Oreille Association, six; Potlatch Association, three; Priest Lake Association, four; Kaniksu National Forest, three; Pend Oreille National Forest, three; and on the St. Joe National Forest, nine.

D. Training of Temporary Assistants:

Training camps were held at Pierce, Idaho; Fernwood, Idaho; Coolin, Idaho; Avery, Idaho; and Metaline Falls, Washington, at the beginning of the field season for the purpose of training the temporary crew men and to standardize the field methods. The Coeur d'Alene and Potlatch Association crews were trained at Fernwood, the Priest Lake Association, Pend Oreille Association and Pend Oreille National Forest crews at Coolin, the St. Joe National Forest crew at Avery, the Clearwater Association crew at Pierce and the Kaniksu National Forest crew and the crew which worked in northeastern Washington were trained at Metaline Falls.

Preliminary training consisted in familiarizing the men with the native Ribes of the region and the common shrubs associated with them. They were also given a review in the identification of the tree species of the region. The greater portion of the period was spent in instructing the men in methods and practical application of these methods on the ground by working sections having the various types and conditions represented.

III. Work Performed and Results Obtained on Federal Lands

A. General Location of Work:

1. Kaniksu National Forest

The work on the Kaniksu National Forest was performed on an area extending from the International Boundary south to the south line of Township 36 N. and was bounded on the east by the Shedroof Divide and on the west by the Pend Oreille river.

2. Pend Oreille National Forest

The work on the Pend Oreille National Forest consisted of the following areas: Deer Creek drainage, the area from Myrtle Creek drainage to and including the Pack River drainage; Grouse Creek, Rapid Lightning Creek, Trestle Creek and Lightning Creek drainages.

3. St. Joe National Forest

On the St. Joe National Forest the main division was entirely worked on the south side of the St. Joe river and the area on the north side of the river was worked from the Montana-Idaho state line west to the north fork of the St. Joe river.

5. Training of Temporary Assistants:

Training camps were held at Pierce, Idaho; Fernwood, Idaho; Coolin, Idaho; Avery, Idaho; and Metaline Falls, Washington, at the beginning of the field season for the purpose of training the temporary crew men and to standardize the field methods. The Coeur d'Alene and Potlatch Association crews were trained at Fernwood, the Priest Lake Association, Pend Oreille Association and Pend Oreille National Forest crews at Coolin, the St. Joe National Forest crew at Avery, the Clearwater Association crew at Pierce and the Kaniksu National Forest crew and the crew which worked in northeastern Washington were trained at Metaline Falls.

Preliminary training consisted in familiarizing the men with the native Ribes of the region and the common airborne associated with them. They were also given a review in the identification of the tree species of the region. The greater portion of the period was spent in instructing the men in methods and practical application of these methods on the ground by working questions having the various types and conditions represented.

III. Work Performed and Results Obtained on Federal Lands

A. General Location of Work:

1. Kaniksu National Forest

The work on the Kaniksu National Forest was confined on an area extending from the International Boundary south to the south line of Township 36 N. and was bounded on the east by the Continental Divide and on the west by the Pend Oreille river.

2. Pend Oreille National Forest

The work on the Pend Oreille National Forest consisted of the following areas: Deer Creek drainage, the area from Myrtle Creek drainage to and including the Pack River drainage; Grouse Creek, Rapid Lightning Creek, Trestle Creek and Lightning Creek drainages.

3. St. Joe National Forest

On the St. Joe National Forest the main division was entirely worked on the south side of the St. Joe river; and the area on the north side of the river was worked from the Montana-Idaho state line west to the north fork of the St. Joe river.

B. Kaniksu National Forest:

1. Detailed Location

T 65 N, R 5 W	Boise Meridian	8,17,20,29,32
T 40 N, R 45 E	Willamette Meridian	Entire Township
T 40 N, R 44 E	" "	Entire Township
T 40 N, R 43 E	" "	Entire Township east of Pend Oreille River
T 39 N, R 45 E	" "	2-11,14-22,28-32 all inclusive
T 39 N, R 44 E	" "	1-12,16-21,25,27-35 all incl.
T 38 N, R 45 E	" "	19,30,31
T 38 N, R 44 E	" "	2-8,14-36 all inclusive
T 37 N, R 44 E	" "	Entire Township
T 37 N, R 43 E	" "	1,12,36
T 36 N, R 44 E	" "	2-11,14-21,30 all inclusive
T 36 N, R 43 E	" "	1-3,10-15,22-24 all inclusive

2. Results of work:

TABLE NO. 1

Per cent Covered by Reconnaissance
Kaniksu National Forest

Area in Acres	Worked 1927	Total Area Worked to Date	Per cent Worked to Date
657,620	147,182	200,108	30.43

3. Lassen National Forest:

1. Detailed Location

T 65 N., R 5 W	Boise Meridian	5,17,20,25,26
T 40 N., R 6E E	Willamette Meridian	Entire Township
T 40 N., R 5E E	"	Entire Township
T 40 N., R 4E E	"	Entire Township east of Pend.
T 40 N., R 3E E	"	Oroville River
T 39 N., R 6E E	"	2-11,14-22,26-32 all inclusive
T 39 N., R 4E E	"	1-12,16-21,25,27-36 all incl.
T 38 N., R 6E E	"	19,30,31
T 38 N., R 4E E	"	3-8,14-36 all inclusive
T 37 N., R 4E E	"	Entire Township
T 37 N., R 3E E	"	1,12,36
T 36 N., R 4E E	"	3-11,14-21,30 all inclusive
T 36 N., R 3E E	"	1-3,10-15,22-24 all inclusive

2. Percent of work:

TABLE NO. 1

Per cent Cored by Reconnaissance
Lassen National Forest

Area in Acres	Worked 1917	Total Area Taxed to Date	Per cent Worked to Date
857,680	141,140	200,106	29.45

TABLE NO. 2

Per cent of Types Covered by Reconnaissance
Kaniksu National Forest
1927

Type	Acres	Per cent
White Pine:	17,823	12.11
Stream	371	.25
Other Timber	35,529	55.12
Forest Land Not Repro:		
Brush	4,637	3.15
Burn	35,819	24.34
Cutover	640	.43
Non Forest Land:		
Rock	61	.04
Meadow	44	.03
Barren	2,253	1.53
Total	147,182	100

Table No. 2

Per cent of Type Covered by Impermeable Zones Following Tribal Treaty
1827

Type	Acres	Per cent
Tile Pine:	17,829	12.11
Spruce	371	.25
Other Timber	84,749	57.17
Forest Land Not Repro:		
Brush	4,617	3.14
Burn	25,819	16.94
Cultivated	600	.42
Non Forest Land:		
Rock	81	.04
Marshy	44	.03
Water	2,788	1.71
Total	147,138	100

TABLE NO. 3

Age Classes by Eradication Types
(White Pine Only)
Kaniksu National Forest
1927

Eradication Type	Age Classes by Eradication Types								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total
Dense Mature							74		74
Open Mature						322	7,371	1,241	8,934
Dense Pole									
Open Pole				1,102	648	843			2,593
Dense Reproduction		144							144
Open Reproduction	19	2,069	3,771	219					6,078
Total	19	2,213	3,771	1,321	648	1,165	7,445	1,241	17,823

Table No. [illegible]

Age Classes by Dedication Type
(Brule Fine Only)
Manitou National Forest
1927

Dedication Type	Age Classes by Decade								Dedication Totals	
	0- 10	11- 20	21- 30	31- 40	41- 50	51- 60	61- 70	71- 80	800a	Total
Tease Nature								74		74
Open Nature								[illegible]	[illegible]	[illegible]
Tease Pole										
Open Pole					1,108	548	862			[illegible]
Tease Reproduction			144							144
Open Reproduction	19	2,069	2,272	214						[illegible]
Total	19	2,213	2,272	1,322	548	1,108	862	74	1,941	[illegible]

TABLE NO. 4

Ribes per Acre on White Pine Type Covered
by
Intensive Reconnaissance
Kaniksu National Forest
1927

Eradication Type	Ribes Free Acres	Ribes Present				Total Ribes	Total Acres
		Acres	Ave. No. Ribes per A. R.lac.	P.vis.	Total		
Dense Mature	74						74
Open Mature	1,373	2,952	44.20	2.61	46.81	138,177	4,325
Dense Pole							
Open Pole	690	148	296.46		296.46	43,876	838
Dense Reproduction	144						144
Open Reproduction	1,112	1,973	58.13	17.78	75.91	149,785	3,085
Stream		371	443.37	3.34	446.71	165,729	371
Total	3,393	5,444	83.31	8.09	91.40	497,567	8,837

TABLE NO. 5

White Pine Area Covered by Extensive
Reconnaissance, Kaniksu National
Forest, 1927

Eradication Type	Acres
Dense Mature	
Open Mature	4,609
Dense Pole	
Open Pole	1,755
Dense Reproduction	
Open Reproduction	2,953
Stream	
Total	9,357

TABLE NO. 4

Plots per Acre on Tidal Flats Type Covered
by
Intensive Reconnaissance
Coastal Mapping Format
1957

Vegetation Type	Plots per Acre	Plots Treated				Total Acres	Total Plots
		Acres	Ave. No. Plots per A.		Total		
			R.Ins.	S.Vis.			
Dense Nature	7%						7%
Open Nature	1,975	2,982	44.30	3.61	46,83	138,177	4,328
Dense Pole							
Open Pole	850	147	144.41		425.45	41,174	850
Dense Reproduction	144						144
Open Reproduction	1,112	1,975	58.15	17.75	75.91	149,755	3,065
Stream	37%	445.87	3.54	446.71	166,729	371	
Total	3,283	5,444	53.31	8.05	91.40	497,565	8,857

TABLE NO. 5

White Pine Area Covered by Intensive
Reconnaissance, Eastern National
Forest, 1957

Vegetation Type	Acres
Dense Nature	
Open Nature	4,606
Dense Pole	
Open Pole	1,755
Dense Reproduction	
Open Reproduction	3,343
Stream	
Total	9,704

TABLE NO. 6

White Pine Area Covered by Intensive and Extensive Reconnaissance
Kaniksu National Forest
1927

Eradication Type	Acres
Dense Mature	74
Open Mature	8,934
Dense Pole	
Open Pole	2,593
Dense Reproduction	144
Open Reproduction	6,078
Stream	371
Total	18,194

C. Pend Oreille National Forest

1. Detailed location

Boise Meridian	Sections
T. 64 N, R. 3 E	8-10,15-22,27-34 all inclusive
T. 63 N, R. 3 E	3-5,7-10,14-20 all inclusive
T. 62 N, R. 1 W	5-8,17-20,29-32 all inclusive
T. 62 N, R. 2 W	Entire township east of Pend Oreille National Forest boundary.
T. 62 N, R. 3 W	Entire township east of Pend Oreille National Forest boundary.
T. 61 N, R. 2 W	1-12,15-22,27-34 all inclusive
T. 61 N, R. 3 W	Entire township east of Pend Oreille National Forest boundary.
T. 60 N, R. 2 W	3-11, 13-36 inclusive
T. 60 N, R. 3 W	Entire township east of Pend Oreille National Forest boundary.
T. 59 N, R. 2 E	3-10,15-17,21-23,27-29,31-34 all inclusive.
T. 59 N, R. 1 E	1,10-16,21-25 all inclusive.
T. 59 N, R. 2 W	4
T. 59 N, R. 3 W	Parts of 2,11,14,23,25,26,36 lying east of Pend Oreille National Forest boundary.
T. 58 N, R. 3 E	7,18,19,29-32 inclusive.
T. 58 N, R. 2 E	1-5,9-17,19-36 inclusive.
T. 58 N, R. 1 E	25-27,32-36 all inclusive.
T. 57 N, R. 3 E	Entire township
T. 57 N, R. 2 E	Entire township

Vegetation Type	Acres
Dense Mature	74
Open Mature	1,814
Dense Pole	
Open Pole	2,751
Dense Reproduction	144
Open Reproduction	2,274
Grass	771
Total	15,154

C. Pend Oreille National Forest

1. Detailed Location

Legal Description	Sections
T. 64 N., R. 2 E.	8-10,15-22,27-34 all inclusive
T. 63 N., R. 2 E.	3-5,7-10,14-20 all inclusive
T. 62 N., R. 1 E.	5-6,17-20,29-32 all inclusive
T. 62 N., R. 2 E.	Entire township east of Pend Oreille National Forest Boundary
T. 62 N., R. 3 E.	Entire township east of Pend Oreille National Forest boundary
T. 61 N., R. 2 E.	1-12,15-22,27-34 all inclusive
T. 61 N., R. 3 E.	Entire township east of Pend Oreille. National Forest boundary
T. 60 N., R. 2 E.	3-11, 15-22 inclusive
T. 60 N., R. 3 E.	Entire township east of Pend Oreille National Forest boundary
T. 59 N., R. 2 E.	3-10,15-17,21-23,27-29,31-34 all inclusive.
T. 59 N., R. 3 E.	1,10-16,21-28 all inclusive.
T. 58 N., R. 2 E.	Parts of 2,11,14,23,25,26,35 lying east of Pend Oreille National Forest boundary.
T. 58 N., R. 3 E.	7,18,19,29-32 inclusive.
T. 57 N., R. 2 E.	1-5,9-17,19-28 inclusive.
T. 57 N., R. 3 E.	25-27,33-36 all inclusive.
	Entire township
	Entire township

worked by the Pend Oreille Timber Protective Association crew in charge of Mr. Gail. This acreage was combined with that worked by the [illegible] all the acreage would [illegible] table.

T. 57 N., R. 1 E.	1-3,9-16,22-26,36 all inclusive.
T. 56 N., R. 2 E.	Entire township
T. 56 N., R. 3 E.	1-4,7-36 inclusive
T. 55 N., R. 3 E.	Entire township north of Clarks Fork River.
T. 55 N., R. 2 E.	Entire township north of Clarks Fork River.

[illegible]

S. Results of work

[illegible]

1927

TABLE NO. 7

Per Cent Covered by Reconnaissance, Pend Oreille National Forest

Area in Acres	Worked by ?	Total area worked to date	Per cent worked to date
874,736	241,475	241,475	27.61

TABLE NO. 8

Acres and Per Cent of Types Covered by Reconnaissance Pend Oreille National Forest, 1927.

Type	Acres	Per cent
White Pine	55,491	24.11
Stream	653	.28
Other Timber	136,113	57.11
Forest Land not Logged.		
Brush	26,715	11.07
Cutover	195	.07
Burn	5,467	2.26
Nonforest Land		
Cultivated	20	.3
Barren	5,525	2.41
Rock	5,352	2.32
	241,475	100

* Of this 241,475 acres worked in 1927, 127,310 acres (or 57%) were

worked by the Pend Oreille Timber Protective Association crew in charge of Mr. Geil. This acreage was combined with that worked by the Federal crew so that all the Pend Oreille National Forest acreage would appear in one table.

TABLE NO. 9

Age Classes by Eradication Types
(White Pine Only)
Pend Oreille National Forest
1927

Eradication Type	Age Classes by Acres								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total
Dense Mature						1,614	3,630	298	5,542
Open Mature						520	25,650	2,753	28,923
Dense Pole				1,467	106	253			1,826
Open Pole				490	445	540			1,475
Dense Repr.		893	4,036						4,929
Open Repr.	1,470	4,731	9,131	395					15,727
Total	1,470	5,624	13,167	2,352	551	2,927	29,280	3,050	58,421

worked by the Pond Oreille Timber Protective Association crew in charge of Mr. Geil. This acreage was combined with that worked by the Federal crew so that all the Pond Oreille National Forest acreage would appear in one table.

TABLE NO. 8

Age Classes by Breakeetion Types
(Falls from Only)
Pond Oreille National Forest
1927

Breakeetion Type	Age Classes by Acres								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	201+	Total
Dense Yellow Pine							1,814	3,830	5,644
Open Mature							590	25,800	26,390
Dense Pole				1,467	106	353			1,926
Open Pole				490	446	540			1,476
Dense Repr.			893	4,036					4,929
Open Repr.	1,470	4,781	5,141		395				15,727
Total	1,470	5,084	13,127	5,993	947	893	2,404	29,630	59,547

TABLE NO. 10

Ribes per Acre on White Pine Type Covered
by
Intensive Reconnaissance
Pend Oreille National Forest
1927

Eradication Type	Ribes Free Acres	Ribes Present					Total Ribes	Total Acres
		Acres	Ave. No. Ribes per Acre					
			lac.	visc.	colo.	Total		
Dense Mature	2,690	2,158	15.64	1.33		16.97	36,627	4,848
Open Mature	3,870	14,476	43.42	4.30	.19	47.91	693,564	18,346
Dense Pole	304	1,196	18.23	.50		18.73	22,400	1,500
Open Pole	368	623	18.63	2.23		20.86	15,997	991
Dense Reproduction	990	2,278	6.94	.37		7.31	16,653	3,268
Open Reproduction	3,536	8,035	30.42	16.24		46.66	374,994	11,571
Stream	30	653	107.13	3.13	.06	110.37	72,069	683
Total	11,788	29,419	34.98	6.81	.10	41.89	1,232,304	41,207

6-16

TABLE NO. 10

Bids per Acre on Sixty Tree Type Contract

by

Intensive Reconnaissance

Pend Oreille National Forest

1947

Species Type	Acres	Bids			Total Bids
		Ave. No. Trees per Acre	Ave. Bid per Acre	Total	
Small Reproduction Type					
Dense Mature	1,800	1,452	$ 4.20	$ 7,560.00	
Open Mature	3,400	1,368	4.31	14,654.00	
Dense Pole	700	1,368	4.73	3,311.00	
Open Pole	300	1,368	4.90	1,470.00	
Dense Understocked	900	1,368	4.57	4,113.00	
Open Understocked	1,500	1,368	4.18	6,270.00	
Total	8,600			$ 37,378.00	

TABLE NO. 11

White Pine Area Covered by Extensive Reconnaissance
Pend Oreille National Forest
1927

Eradication Type	Acres
Dense Mature	694
Open Mature	10,576
Dense Pole	326
Open Pole	484
Dense Reproduction	1,661
Open Reproduction	4,156
Stream	
Total	17,897

TABLE NO. 12

White Pine Area Covered by Intensive and Extensive Reconnaissance
Pend Oreille National Forest
1927

Eradication Type	Acres
Dense Mature	5,542
Open Mature	23,922
Dense Pole	1,336
Open Pole	1,475
Dense Reproduction	4,929
Open Reproduction	15,727
Stream	683
Total	54,104

TABLE NO. 11

White Pine Area Covered by Reference
Second Growth
Land Prefix National Forest
1937

Vegetation Type	Acres
Dense Nature	8,4[illegible]
Open Nature	10,726
Dense Pole	2,5[illegible]
Open Pole	4,[illegible]
Dense Reproduction	1,881
Open Reproduction	4,162
Stream	
Total	32,867

TABLE NO. 12

White Pine Area Covered by Reference
and Reference Secondgrowth
Land Prefix National Forest
1937

Vegetation Type	Acres
Dense Nature	8,[illegible]
Open Nature	22,[illegible]
Dense Pole	1,[illegible]
Open Pole	3,47[illegible]
Dense Reproduction	4,[illegible]
Open Reproduction	12,[illegible]
Stream	[illegible]
Total	55,[illegible]

D. St. Joe National Forest

1. Detailed location

The following townships which are all east of the Boise Meridian have been entirely worked:

T.42 N, R.6 E; T.42 N, R.8 E; T. 43 N, R. 5 E; T. 43 N, R. 6 E; T.43N,R.7E; T.43 N, R.8 E; T.43 N, R.9 E; T. 43 N, R. 10E; T. 44 N, R. 6 E; T.44 N, R.7 E; T.44 N, R.8 E; T. 43 N, R. 11E; T. 44 N, R. 9 E; T.44 N, R.10E; T.45 N, R.9 E.

The following townships which are all east of the Boise Meridian have been worked as shown:

T. 42 N, R. 5 E.	Sections: 1-5,9-16,21-25,36 inclusive.
T. 42 N, R. 7 E.	1-31,33,34,36 inclusive.
T. 42 N, R. 9 E.	1-27,30 inclusive.
T. 42 N, R.10 E.	1-10,16-21 inclusive
T. 42 N, R.11 E.	5-7 inclusive.
T. 44 N, R. 3 E.	13-36 inclusive.
T. 44 N, R. 4 E.	2,6-36 inclusive.
T. 44 N, R. 5 E.	28-33,36 inclusive.
T. 45 N, R. 4 E.	13,24,25,36.
T. 45 N, R. 5 E.	16-21,28-30 inclusive.
T. 45 N, R. 7 E.	16,21-23,25-28,33-36 inclusive
T. 45 N, R. 8 E.	10-15,21-36 inclusive

2. Results of work

TABLE NO. 13

Per Cent Covered by Reconnaissance
St. Joe National Forest

Area in Acres	Worked 1927	Total Area Worked to Date	Per cent Covered to Date
867,450	426,860	464,710	53.57

B. 65. The National Forest

1. Detailed Description

The following townships which are all east of the Boise Meridian have been entirely covered:

T. 42 N., R. 6 E.; T. 42 N., R. 8 E.; T. 43 N., R. 5 E.; T. 43 N., R. 6 E.; T. 43N., R. 7 E.;
T. 43 N., R. 8 E.; T. 43 N., R. 9 E.; T. 44 N., R. 10E.; T. 44 N., R. 6 E.;
T. 44 N., R. 7 E.; T. 44 N., R. 8 E.; T. 44 N., R. 11E.; T. 44 N., R. 9 E.;
T. 44 N., R. 10E.; T. 45 N., R. 9 E.

The following townships which are all east of the Boise Meridian have been worked as shown:

T. 42 N., R. 8 E. Sections: 1-5, 9-16, 21-28, 36 inclusive.
T. 43 N., R. 7 E. 1-31, 33, 34, 36 inclusive.
T. 43 N., R. 9 E. 1-27, 30 inclusive.
T. 43 N., R. 10 E. 1-10, 16-21 inclusive
T. 44 N., R. 11 E. 5-7 inclusive.
T. 44 N., R. 8 E. 13-36 inclusive.
T. 44 N., R. 9 E. 2, 6-36 inclusive.
T. 44 N., R. 10 E. 25-33, 36 inclusive.
T. 45 N., R. 9 E. 13, 24, 25, 36.
T. 45 N., R. 10 E. 16-21, 28-30 inclusive.
T. 45 N., R. 7 E. 16, 21-23, 25-28, 33-36 inclusive
T. 45 N., R. 8 E. 13-15, 21-36 inclusive

2. Progress of Work

Area Covered by Reconnaissance
B. 65. The National Forest

Area in Acres	Surveyed 1907	Total Area Surveyed to Date	Per cent Covered to Date
647,440	456,000	464,720	71.7

TABLE NO. 14

Acreage and Per Cent of Types Covered
by
Reconnaissance
St. Joe National Forest, 1927

Type	Acres	Per Cent
White Pine	139,787	32.75
Stream	917	.21
Other timber	206,540	48.39
Forest Land not Reprod.		
Brush	17,368	4.07
Cutover	765	.18
Burn	47,938	11.23
Non Forest Land		
Barren	8,815	2.07
Meadow	275	.06
Rock	4,455	1.04
Total	426,680	100.00

TABLE NO. 15

Age Classes by Eradication Types
(White Pine Only)
St. Joe National Forest, 1927

Eradication Type	Age Classes by Eradication Types.								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total
Dense Mature									
Open Mature						18,295	14,191	31,912	64,398
Dense Pole									
Open Pole			165	7,745	10,376	8,640			26,926
Dense Reprod.	30			120					150
Open Reprod.	41,413	5,105	1,645	150					48,313
Total	41,443	5,105	1,810	8,015	10,376	26,935	14,191	31,912	139,787

TABLE NO. 14

Acreage and Per Cent of Types Covered
by
Reconnaissance
St. Joe National Forest, 1927

Type	Acres	Per Cent
White Pine	139,727	32.75
Stream	917	.21
Other timber	206,540	48.39
Forest Land not Barred.		
Brush	17,368	4.07
Cutover	755	.18
Burn	47,038	11.02
Non Forest Land		
Barren	8,315	2.07
Meadow	275	.06
Rock	4,445	1.04
Total	426,630	100.00

TABLE NO. 15

Acre Differences by Predisposition Types
(White Pine Only)
St. Joe National Forest, 1927

Predisposition Types	Acre Differences by Predisposition Types.							
	0- 10	11- 20	21- 40	41- 60	61- 80	81- 100	101- 200	200+ To
Dense Mature								
Open Mature						18,295	14,191	21,212 64
Dense Pole								
Open Pole			165	7,748	10,376	8,640		25
Dense Reprod.	30			120				
Open Reprod.	41,413	5,108	1,645	150				41
Total	41,445	5,108	1,810	8,015	10,376	26,935	14,191	21,212 129

TABLE NO. 16

Ribes per Acre on White Pine Type Covered
by
Intensive Reconnaissance
St. Joe National Forest
1927

Eradication Type	Ribes Free Acres	Ribes Present Acres	Average Number Ribes per Acre. lac.	visc.	pet.	trist	irrig.	Total	Total Ribes	Total Acres
Dense Mature										
Open Mature	3,701	15,762	99.76	3.60	3.82		.46	107.64	1,696,663	15,463
Dense Pole										
Open Pole	1,636	6,520	75.15	19.60	15.62	12.23	3.04	125.63	819,111	6,156
Dense Reproduction	120									120
Open Reproduction	935	11,791	76.79	41.50	18.80	16.02		153.10	1,805,261	12,726
Stream	10	907	516.20	5.85	299.20	18.20	19.58	859.07	779,175	917
Total	6,402	34,980	98.23	19.41	18.73	8.15	1.28	145.80	5,100,210	41,382

Table No. 15

Births per 1000 male live Deaths Covered

by

Internal Revenue Districts

for the Fiscal Year

1941

Internal Revenue Districts	Total Population	Births												Deaths											
		Total	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Alaska																									
Arizona	499,261	12,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
Arkansas	1,949,387	46,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	19,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
California	6,907,387	165,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	66,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Colorado	1,123,296	27,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	11,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Connecticut	1,709,242	41,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	16,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Delaware	266,505	6,000	500	500	500	500	500	500	500	500	500	500	500	500	2,000	200	200	200	200	200	200	200	200	200	200
District of Columbia	1,460,853	35,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	14,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Florida	1,897,414	46,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	19,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Georgia	3,123,723	75,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	30,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Hawaii	423,330	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	4,000	500	500	500	500	500	500	500	500	500	500
Idaho	524,873	12,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
Illinois	7,897,241	190,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	76,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Indiana	3,427,796	82,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	33,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Iowa	2,538,268	61,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	24,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Kansas	1,801,028	43,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	17,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Kentucky	2,845,627	68,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	27,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Louisiana	2,363,880	57,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	23,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Maine	1,124,660	27,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	11,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Maryland	2,821,066	68,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	27,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Massachusetts	4,316,721	104,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	42,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Michigan	5,256,106	126,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	51,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Minnesota	2,792,300	67,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	27,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Mississippi	2,183,796	52,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	21,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Missouri	3,784,664	91,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	37,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Montana	559,456	13,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
Nebraska	1,315,834	32,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	13,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Nevada	110,247	3,000	300	300	300	300	300	300	300	300	300	300	300	300	1,000	100	100	100	100	100	100	100	100	100	100
New Hampshire	491,524	12,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
New Jersey	4,160,165	100,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	40,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
New Mexico	531,818	13,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
New York	13,479,142	324,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	130,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
North Carolina	3,571,623	86,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	34,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
North Dakota	641,935	15,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	6,000	500	500	500	500	500	500	500	500	500	500
Ohio	6,907,612	165,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	66,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Oklahoma	2,336,434	56,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	22,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Oregon	1,089,684	26,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Pennsylvania	9,900,180	237,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	95,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Rhode Island	713,346	17,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	7,000	500	500	500	500	500	500	500	500	500	500
South Carolina	1,899,804	46,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	19,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
South Dakota	642,961	15,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	6,000	500	500	500	500	500	500	500	500	500	500
Tennessee	2,915,841	70,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	28,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Texas	6,414,824	154,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	62,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Utah	550,310	13,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	500	500	500	500	500	500	500	500	500	500
Vermont	359,611	9,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	4,000	500	500	500	500	500	500	500	500	500	500
Virginia	2,677,773	64,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	25,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Washington	1,736,191	41,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	16,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
West Virginia	1,901,974	46,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	19,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Wisconsin	3,137,587	75,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	30,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Wyoming	250,742	6,000	500	500	500	500	500	500	500	500	500	500	500	500	2,000	200	200	200	200	200	200	200	200	200	200
Total	132,639,125	3,180,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	265,000	1,274,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000

TABLE NO. 17

White Pine Area Covered by
Extensive Reconnaissance
St. Joe National Forest
1927

Eradication Type	Acres
Dense Mature	
Open Mature	44,935
Dense Pole	
Open Pole	19,260
Dense Reproduction	30
Open Reproduction	35,587
Stream	
Total	99,812

TABLE NO. 18

White Pine Area Covered by Intensive
and Extensive Reconnaissance
St. Joe National Forest, 1927

Eradication Type	Acres
Dense Mature	
Open Mature	64,393
Dense Pole	
Open Pole	26,926
Dense Reproduction	150
Open Reproduction	48,313
Stream	917
Total	140,704

TABLE NO. 17

White Pine Area Covered by
Estimative Reconnaissance
St. Joe National Forest
1937

Vegetation Type	Acres
Dense Mature	
Open Mature	44,455
Dense Pole	
Open Pole	15,893
Dense Reproduction	7
Open Reproduction	85,067
Stream	
Total	85,817

TABLE NO. 18

White Pine Area Covered by Intensive
and Extensive Reconnaissance
St. Joe National Forest, 1937

Vegetation Type	Acres
Dense Mature	
Open Mature	[illegible]
Dense Pole	
Open Pole	53,566
Dense Reproduction	180
Open Reproduction	41,313
Stream	317
Total	140,376

TABLE NO. 19

Time Analysis, Man Days 1927

Forest	Travel	Sick	Office	Moving Camp	Rain	Fire	Reconn.	Training	Sundays & Holidays	Total
Kaniksu	11		26	59	23		157	18	53	347
Pend Oreille	48		40	41	17		334	61	97	638
St. Joe	37	1	68	117	63	14	370	43	102	815
Total	96	1	134	217	103	14	861	122	252	1,800

TABLE NO. 20

Training Costs, 1927

Forest	Subsis-tence	Transpor-tation of men	Salaries	Total	Number of men	Cost per man
Kaniksu	$ 20.90		$ 27.00	$ 47.90	3	$ 15.97
Pend Oreille	109.33	$16.08	193.35	318.76	8	39.84
St. Joe	63.75		130.51	194.26	9	21.58
Totals and Averages	$193.98	$16.08	$350.86	$560.92	20	$ 28.04

TABLE NO. 21

Reconnaissance Cost
1927

Forest	Subsis-tence	Equip-ment	Transp. of men	Salaries	Total	Acres Worked	Cost per A.
* Kaniksu	$ 437.10	$ 37.94	$ 29.94	$ 807.00	$1,311.98	149,252	$.009
** Pend Oreille	598.86	170.61	47.72	2,060.22	2,877.41	242,763	.012
*** St. Joe	1,226.50	113.81	82.11	2,520.90	3,943.32	426,860	.009
Totals and Averages	$2,262.46	$322.36	$159.77	$5,388.12	$8,132.71	818,875	.01

* The crew on the Kaniksu National Forest did not maintain a separate camp but shared camp with a Forest Service crew making a timber survey of the same region. The cost was determined at the termination of the field season on a pro rata basis according to the number of meals taken. This cost amounted to $.87 per meal.

** Crews working on the Pend Oreille National Forest were supplied in part from Forest Service Central Purchase supplies and partly from local purchase at stores and from lumber companies.

*** Subsistence for the various crews on the St. Joe National Forest was furnished by the Forest Service on the basis of a flat rate of $1.50 per man day.

TABLE NO. 20

Training Costs, 1927

Forest	Subsis-tence	Transpor-tation of men	Salaries	Total	Number of men	Cost per man
Kamikaw	$ 20.50		$ 27.00	$ 47.50	8	$ 15.87
Pond Oreille	109.35	$26.08	193.85	318.76	8	39.84
St. Joe	68.75		130.81	194.26	9	21.58
Totals and Averages	198.60	$41.08	$350.86	$590.52	30	$ 19.04

TABLE NO. 21

Maintenance Cost
1927

Forest	Subsis-tence	Equip-ment	Transp. of men	Salaries	Total	Horse Months	Cost per
* Kamikaw	$ 417.10	$ 37.94	$ 29.54	$ 807.00	$1,311.58	147.4	$ 8.9
** Pond Oreille	856.50	170.81	47.76	2,065.12	3,177.41	342.7	9.2
*** St. Joe	1,756.50	113.21	65.11	2,450.00	4,384.82	484.8	9.0
Totals and Averages	$3,252.46	$321.96	$142.41	$5,322.12	$8,873.81	974.9	9.1

* The crew on the Kamikaw National Forest did not maintain a separate camp but shared camp with a Forest Service crew making a timber survey in the same region. The cost was determined at the termination of the field season on a pro rata basis according to the number of meals taken. This cost amounted to $.87 per meal.

** Crews working on the Pond Oreille National Forest were supplied in part from Forest Service Central Purchase supplies and partly from local purchase at stores and from lumber companies.

*** Subsistence for the various crews on the St. Joe National Forest was furnished by the Forest Service on the basis of a flat rate of $1.50 per man day.

IV. Work Performed and Results Obtained on Private Lands

A. General location of work:

Reconnaissance work was carried on on the five north Idaho timber protective association, viz: Clearwater T. P. A; Coeur d'Alene T.P.A; Pend Oreille T.P.A; Potlatch T.P.A; and Priest Lake T.P.A.

B. Clearwater Timber Protective Association

1. Detailed location:

		Sections
T. 39 N R. 4 E	Silver Creek Area	1-3,10-15
T. 36 N R. 5 E	Brown's Creek & Orofino Creek	7-9,11-36
T. 38 N R. 5 E	Upper Reed's Creek Area	1-3,10-14
T. 38 N R. 4 E	Meadow Creek Area	1-3,10-15,22-24
T. 38 N R. 6 E	Washington Creek Meadows Area	1-22,29,30,33-35
T. 37 N R. 6 E	Breakfast Creek Area	3-5,8,9

2. Results of work:

Table No. 22, 23, 24, 25, 26, 27.

TABLE NO. 22

Percentage of the Clearwater Association Covered by Reconnaissance

Total Area In Acres	Year	Area Worked In Acres	Per cent
	1924	1915	.27
	1925	3480	.50
	1926	38400	5.46
	1927	60160	8.56
702,760	To Date	103,955	14.79

IV. Work Performed and Results Obtained on Private Lands

A. General location of work:

Reconnaissance work was carried on on the five north Idaho timber protective associations, viz: Clearwater T. P. A; Coeur d'Alene T.P.A; Pend Oreille T.P.A; Potlatch T.P.A; and Priest Lake T.P.

B. Clearwater Timber Protective Association

1. Detailed location:

		Sections
T. 39 N R. 4 E	Silver Creek Area	1-3,10-15
T. 38 N R. 5 E	Brown's Creek & Orofino Creek	7-9,17-36
T. 38 N R. 5 E	Upper Reed's Creek Area	1-3,10-14
T. 38 N R. 4 E	Meadow Creek Area	1-3,10-15,22-24
T. 38 N R. 6 E	Washington Creek Meadows Area	1-36,29,30,33-3
T. 37 N R. 6 E	Breakfast Creek Area	3-5,8,9

2. Results of work:

Table No. 22, 23, 24, 25, 26, 27.

TABLE NO. 26

Percentage of the Clearwater Association
Covered by Reconnaissance

Total Area In Acres	Year	Area Worked In Acres	Per Cent
	1924	1918	.37
	1925	2480	.50
	1926	23400	5.48
	1927	8040	8.95
702,720	To Date	103,955	14.79

TABLE NO. 23

Acreage and Per Cent of Types Covered by
Reconnaissance, Clearwater Timber Protective Association
1927

Land Division	Acres	Per Cent
White Pine Type	51,513	85.63
Stream	405	.67
Other Timber Types	3,858	6.41
Forest Land not Reproducing		
Brush	2,846	4.73
Burn	0	.00
Cutover	0	.00
Non Forested Land		
Cultivated	0	.00
Meadow	1,538	2.56
Barren	0	.00
Rock	0	.00
Totals	60,160	100.00

TABLE NO. 24

Age Classes by Tradication Types
(White Pine Only)
Clearwater Timber Protective Association
1927

Tradication Type	Age Classes								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total Acres
Dense Mature						730	5,649		6,379
Open Mature						1,903	37,152		39,055
Dense Pole				25	235				260
Open Pole				25	814				839
Dense Repro.		475	463	30					968
Open Repro.	520	1,943	1,549						4,012
Totals	520	2,418	2,012	80	1,049	2,633	42,801		51,513

Land Division	Acres	Per Cent
White Pine Type	51,313	85.63
Spruce	405	.67
Other Timber Types	2,354	3.91
Forest land not in production		
Brush	5,546	9.25
Burn	0	.00
Cleared	0	.00
Non Forested Land		
Cultivated	0	.00
Meadow	1,519	2.56
Barren	0	.00
Rock	0	.00
Totals	60,140	100.00

Table No. 24

Age Classes By Predisaster Types
(Unit is Tree Only)
Dunsmuir Timber Protective Association
1927

Predisaster Type	Age Classes							Total Acres	Stock
	0-10	11-20	21-40	41-60	61-80	81-100	101-200		
Dense Mature						730	5,849		
Open Mature						1,306	27,158		
Dense Pole				24	2,418				
Open Pole				25	814				
Dense Forte.		475	663	30					
Open Forte.	200	1,441	1,847						
Totals	200	2,416	2,510	80	3,232	2,036	33,007		

TABLE NO. 25

Ribes per Acre on White Pine Type Covered
by
Intensive Reconnaissance
Clearwater Timber Protective Association
1927

Predication Type	Ribes Free Acres	Ribes Present							Total Ribes	Total Acres
		Acres	Average Number Ribes per Acre							
			lac.	visc.	pet.	iner.	irrig.	Total		
Dense Mature	2,805	450	8.96	0	0	0	0	8.96	4,030	3,255
Open Mature	4,094	10,694	51.22	1.60	.82	0	.48	54.12	578,802	14,788
Dense Pole	105	25	0	5.00	0	0	0	5.00	125	130
Open Pole	159	150	6.77	.76	0	0	0	7.53	1,130	309
Dense Reproduction	258	260	0	5.00	0	0	0	5.00	1,300	518
Open Reproduction	185	1,417	33.96	127.88	0	0	0	211.84	300,184	1,602
Stream	3	235	76.54	0	162.03	8.17	.21	247.00	58,049	238
Totals and Averages	7,609	13,231	52.13	15.10	3.54	.15	.40	71.32	943,620	20,840

TABLE NO. 35

Miles per Acre on Thin Tar Type Covered by Intensive Reconnaissance Cleveland Timber Protective Association 1927

Type of Cover	Total Miles	Miles Present — Average Number Miles per Acre							Miles per Acre
		Total	Farm	Town	Pet.	Vac.	Inc.	Area	
Cedar Swamp	6,040	4.48	0	0	0	0	6.48	850	8,809
Open Pasture	579,628	64.12	.45	0	.82	1.80	82.22	9,048	14,788
Home Site	125	5.00	0	0	0	5.04	0	85	105
Open Site	1,140	7.62	0	0	0	.76	6.72	180	159
Dense Hardwood Section	1,500	5.00	0	0	0	5.00	0	280	254
Open Reproduction	300,184	211.84	0	0	0	1272.86	82.96	1,417	185
Virgin	84,049	212.00	.21	8.17	0	182.08	76.54	25	2
Totals and Averages	894,650	71.32	.40	.16	1.84	15.10	72.18	12,721	7,809

TABLE NO. 26

White Pine Area Covered
by
Extensive Reconnaissance
Clearwater T. P. A.
1927

Eradication Type	Acres
Dense Mature	3,124
Open Mature	24,267
Dense Pole	130
Open Pole	530
Dense Reproduction	450
Open Reproduction	2,410
Stream	167
Totals	31,078

TABLE NO. 27

White Pine Area Covered
by Intensive and Extensive Reconnaissance
Clearwater T. P. A.
1927

Eradication Type	Acres
Dense Mature	6,379
Open Mature	39,055
Dense Pole	260
Open Pole	839
Dense Reproduction	968
Open Reproduction	4,012
Stream	405
Totals	51,918

TABLE NO. 26

Cutover Areas
by
Extensive Reconnaissance
Clearwater T. F. A.
1957

Vegetation Type	Acres
Dense Mature	1,154
Open Mature	4,687
Dense Pole	130
Open Pole	650
Dense Reproduction	450
Open Reproduction	8,413
Grass	157
Total	31,072

TABLE NO. 27

Cutover Areas
by Intensive and Extensive Reconnaissance
Clearwater T. F. A.
1957

Vegetation Type	Acres
Dense Mature	5,519
Open Mature	20,055
Dense Pole	580
Open Pole	650
Dense Reproduction	406
Open Reproduction	4,012
Grass	450
Total	31,312

C. Coeur d'Alene Timber Protective Association

1. Detailed location:

South Fork St.Maries River drainage

T. 41 N R. 2 E Sections 2, 3.
T. 42 N R. 2 E Sections 11, 13, 14, 23-26, 34-36.
T. 42 N R. 3 E Sections 17, 19, 30.

Carpenter Creek drainage

T. 43 N R. 1 E Sections 6-8, 17-19.
T. 43 N R. 1 W Sections 11-16, 21-23, 25-28, 33, 34.

John Creek drainage

T. 44 N R. 2 W Sections 3-5, 8-10, 15-17.

Bond Creek drainage

T. 45 N R. 1 E Sections 2-5, 8-11, 14-17, 21-23, 27, 28.

Thorn Creek drainage

T. 45 N R. 2 W Sections 12, 13, 24.
T. 45 N R. 1 W Sections 7, 16-21, 28-30.

2. Results of work:

Tables No. 28, 29, 30, 31, 32, 33.

TABLE NO. 28

Percentage of the Coeur d'Alene Association Covered by Reconnaissance

Total Area in Acres	Year	Area Worked in Acres	Per cent
	1924	736	.06
1,301,000*	1925	6,911	.53
	1926	48,240	3.55
	1927	43,640	3.74
	to Date	102,577	7.88

*Exclusive of lands within the National Forest boundary.

6. Coeur d'Alene Timber Protective Association

1. Detailed Description:

South Fork of Coeur d'Alene River Drainage

T. 47 N. R. 3 E. Sections 1, 2.
T. 48 N. R. 3 E. Sections 13, 24, 25-36.
T. 49 N. R. 3 E. Sections 17, 18, 20.

Carpenter Creek Drainage

T. 47 N. R. 1 E. Sections 5-8, 17-18.
T. 48 N. R. 1 E. Sections 31-19, 31-29, 25-28, 33, 34.

John Creek Drainage

T. 46 N. R. 2 E. Sections 4-9, 16-17.

Good Creek Drainage

T. 48 N. R. 1 E. Sections 3-8, 8-11, 14-17, 21-23, 27, 28.

Cave Creek Drainage

T. 47 N. R. 2 W. Sections 13, 24, 24.
T. 47 N. R. 1 W. Sections 7, 16-21, 28-30.

2. Specialized work:

Tables 8, 24, 25, 26, 27, 28, 33.

TABLE 8. 25

Percentage of the Coeur d'Alene
Association Covered by Reconnaissance *

Total Area in Acres	Area Surveyed in Acres	Per cent
	1,284	
1,301,000*	1,225	
	1,243	
	1,277	
	to Date	

*Exclusive of lands within the National Forest boundary.

TABLE NO. 29

Acreage and Per cent of Types Covered by Reconnaissance, Coeur d'Alene T. P. A., 1927

Land Division	Acres	Per cent
White Pine Type	31,760	65.30
Stream	237	.48
Other Timber Types	13,219	27.18
Forest Land not Reproducing		
Brush	2,729	5.61
Non Forested Land		
Cultivated	695	1.43
Total	48,640	100.00

TABLE NO. 30

Age Classes by Eradication Types
(White Pine Only)
Coeur d'Alene T. P. A.,1927

Eradication Types	Age Classes								Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature							1,680		1,680
Open Mature							15,660		15,660
Dense Pole				150					150
Open Pole					127	935			1,062
Dense Repro.			1,905	495					2,400
Open Repro.		180	10,543	85			50		10,808
Totals		180	12,448	730	127	935	17,340		31,760

TABLE NO. 29

Acreage and Per cent of Type Covered by
Reconnaissance, Coeur d'Alene T. F. R., 1927

Land Division	Acres	Per cent
White Pine Type	31,760	86.30
Stream	167	.46
Other Timber Types	13,315	37.18
Forest Land not Reproducing		
Brush	2,759	6.83
Non Forested Land		
Cultivated	865	1.42
Total	46,860	100.00

TABLE NO. 30

Age Classes by Reproduction Types
(White Pine Only)
Coeur d'Alene T. F. R., 1927

Reproduction Types	Age Classes							Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature							1,680		1,680
Open Mature							15,660		15,660
Dense Pole				180					180
Open Pole					127	847			1,052
Dense Repro.			1,805	495					2,400
Open Repro.		150	10,441	85					10,801
Totals		310	12,446	760	127	847	17,340		31,760

TABLE NO. 31

Ribes per Acre on White Pine Type
Covered by
Intensive Reconnaissance
Coeur d'Alene T.P.A.
1927

Eradication Type	Ribes Free Acres	Ribes Present						Total Ribes	Total Acres
		Acres	Average Number Ribes per Acre						
			lacust.	visc.	petiol	inermis	Total		
Dense Mature	1,162	0	0	0	0	0	0	0	1,162
Open Mature	4,121	4,342	10.85	1.64	.35	0	12.84	55,760	8,463
Dense Pole	150	0	0	0	0	0	0	0	150
Open Pole	22	405	11.85	5.62	0	0	17.47	7,075	427
Dense Reproduction	460	780	5.00	0	0	0	5.00	3,900	1,240
Open Reproduction	665	6,066	4.71	13.20	0	0	17.91	108,628	6,731
Stream	0	123	149.76	0	37.05	13.69	200.50	24,662	123
Totals and Averages	6,580	11,716	8.78	7.63	.52	.14	17.07	200,025	18,296

TABLE NO. 21

Urban Net Acre on Dairy Type Farms
by
Intensive Record Farms
County Atlas Township
1947

Classification	Acres	Silos	Dairy Equipment			Dairy Buildings			Total Investment
			Milking Machines	Bulk Tanks	Total	Barns	Milk Houses	Total	
Owner Farmers									
Owner Farmers	4,157	408	1,458	10.85	1,468	4,157	408	4,565	5,033
Owner Tenants	0	0	0	0	0	0	0	0	0
Owner Partners	0	0	0	0	0	0	0	0	0
Owner Managers	0	0	0	0	0	0	0	0	0
Tenant Farmers									
Share Tenants	1,157	208	0	0	0	1,157	208	1,365	1,573
Share Cash Tenants	0	0	0	0	0	0	0	0	0
Cash Tenants	0	0	0	0	0	0	0	0	0
Share Managers	0	0	0	0	0	0	0	0	0
Other Farmers									
Part Owners	1,157	208	0	0	0	1,157	208	1,365	1,573
Managers	0	0	0	0	0	0	0	0	0
Hired Managers	0	0	0	0	0	0	0	0	0
Total and Average	6,470	5.78	1,458	10.85	1,468	6,470	616	7,086	8,554

TABLE NO. 32

White Pine Area Covered by Extensive Reconnaissance, Coeur d'Alene T. P. A.
1927

Eradication Type	Acres
Dense Mature	518
Open Mature	7,197
Dense Pole	
Open Pole	635
Dense Reproduction	1,160
Open Reproduction	4,077
Stream	114
Total	13,701

TABLE NO. 33

White Pine Area Covered by Intensive and Extensive Reconnaissance
Coeur d'Alene T. P. A.
1927

Eradication Type	Acres
Dense Mature	1,630
Open Mature	15,660
Dense Pole	150
Open Pole	1,052
Dense Reproduction	2,400
Open Reproduction	10,308
Stream	237
Total	31,997

TABLE NO. 32

White Pine Area Covered by Extensive
Reconnaissance, Coeur d'Alene T. F. A.
1957

Vegetation Type	Acres
Dense Mature	718
Open Mature	7,147
Dense Pole	
Open Pole	696
Dense Reproduction	1,183
Open Reproduction	4,077
Brush	114
Total	14,735

TABLE NO. 33

White Pine Area Covered by Intensive
and Extensive Reconnaissance
Coeur d'Alene T. F. A.
1957

Vegetation Type	Acres
Dense Mature	1,283
Open Mature	16,350
Dense Pole	150
Open Pole	1,052
Dense Reproduction	2,400
Open Reproduction	10,250
Brush	297
Total	31,932

D. Pend Oreille Timber Protective Association

1. Detailed location:

		Sections
T. 59 N R. 2 W	Pack River	1-3, 12-15, 22-24, 27
T. 58 N R. 2 W	Mt. Casey	17
T. 58 N R. 3 W	Mt. Casey	6, 7
T. 59 N R. 2 W	Mt. Casey	30, 31
T. 59 N R. 3 W	Mt. Casey	2, 11, 14, 23, 25, 26, 36
T. 58 N R. 1 E	Trout Creek	13, 14, 20-24, 28-30
T. 58 N R. 1 W	Rapid Lightning Creek	12, 13
T. 58 N R. 1 W	Rapid Lightning Creek	2-12, 15-19
T. 59 N R. 1 E	Rapid Lightning Creek	25-35
T. 58 N R. 2 E	Rapid Lightning Creek	6-8, 18
T. 59 N R. 1 E	Grouse Creek	21-24
T. 59 N R. 2 E	Grouse Creek	17-20, 30

2. Results of work:

Tables No. 34, 35, 36, 37, 38, 39.

TABLE NO. 34

Percentage of the Pend Oreille Association Covered by Reconnaissance

Total Area in Acres	Year	Area Worked in Acres	Per cent
865,800	1924	3,522	.407
"	1925	4,640	.536
"	1926	33,280	3.843
"	1927	46,400	5.360
	to Date	87,842	10.146

D. Pond Profile Tuples Projective Association

1. Detailed Annotation:

			Sections
T. 59 X R. 2 W	Pond Stream		1-3, 12-15, 22-24, 27
T. 52 X R. 3 W	Mt. Quarry		17
T. 58 X R. 3 W	Mt. Quarry		6, 7
T. 59 X R. 4 W	Mt. Quarry		30, 31
T. 59 X R. 3 W	Mt. Quarry		3, 11, 14, 23, 25, 28, 36
T. 58 X R. 1 W	Trout Creek		13, 14, 20-24, 28-30
T. 52 X R. 1 W	Marsh Lightning Creek		12, 13
T. 52 X R. 1 W	Rapid Lightning Creek		2-13, 15-19
T. 59 X R. 1 W	Rapid Lightning Creek		25-28
T. 58 X R. 2 W	Small Lightning Creek		5-8, 18
T. 59 X R. 1 W	Grouse Creek		31-34
T. 59 X R. 2 W	Grouse Creek		17-20, 29

2. Results of work:

Tables No. 24, 25, 26, 27, 33, 38.

TABLE NO. 24.

Proceedings of the Pond Profile
Association Covered by Increasingness

Total Area in Acres	Area Drawn in Acres	Year	Per cent
822,840	1,744	1914	.457
"	4,840	1915	"
"	23,10	1916	2.84
"	41,430	1917	5.369
	27,344	In Table	10.112

TABLE NO. 35.

Acreage and Per cent of Types
Covered by Reconnaissance
Pend Oreille T. P. A.
1927

Land Division	Acres	Per cent
White Pine Type	13,871	29.9
Stream Type	182	.4
Other Timber Types	19,020	41.0
Forest Lands not producing:		
Brush	7,746	16.7
Burn	3,841	8.3
Cutover	375	.8
Non Forest Lands:		
Rock	1,040	2.2
Fields	65	.14
Meadow	260	.56
Totals	*46,400	100%

* In addition to this 46,400 acres worked this year the Pend Oreille Timber Protective Association crews worked 137,310 acres within the boundaries of the Pend Oreille National Forest. This 137,310 acres were combined with the acreage worked by the Federal crew.

TABLE NO. 36

Age Classes by Eradication Types
(White Pine Only)
Pend Oreille Timber Protective Association
1927

Eradication Types	Age Classes								Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature					90	135	8,585	597	9,407
Open Mature						115	1,350	90	1,555
Dense Pole					940		50		990
Open Pole				310	224				534
Dense Repro.		395		170					565
Open Repro.	260	85	335	140					820
Totals	260	480	335	620	1,254	250	9,985	687	13,871

TABLE NO. 37

Ribes per Acre on White Pine Type
Covered by Intensive Reconnaissance
Pend Oreille Timber Protective Association
1927

Eradication Type	Ribes Free Acres	Ribes Present				Ribes	Acres
		Acres	Ave.No.Ribes per A. lac.	visc.	Total		
Dense Mature	7,107	2,100	4.14	1.18	5.31	11,161	9,207
Open Mature	1,040	430	37.31	19.46	56.78	24,415	1,470
Dense Pole	805	95	20.00	0	20.00	1,900	900
Open Pole	75	149	176.00	0	176.00	26,224	224
Dense Repro.	220	345	6.17	.77	6.94	2,395	565
Open Repro.	285	175	9.14	11.63	20.77	3,635	460
Stream	7	175	64.87	0	64.87	11,353	182
Totals and Averages	9,539	3,469	19.57	3.8	23.37	81,083	13,008

TABLE No. 26

Age Classes by Predisposition Types
(Public Plus Only)
Coal Creville Timber Protective Association
1927

Predisposition Types	Age Classes								Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature					540	1,178	4,685	594	6,407
Open Mature						118	1,770	93	1,981
Dense Pole					540		80		620
Open Pole				214	264				478
Dense Xero.		348		170					518
Open Xero.	280	85	345	140					850
Totals	280	433	345	524	1,344	1,296	6,535	687	11,844

TABLE No. 27

Kibes per Acre on Public Plus Type
Covered by Intensive Reconnaissance
Coal Creville Timber Protective Association
1927

Predisposition Type	Type Acres	Kibes Present			Kibes per Acre
		Acres Re.	Kibes per A.	Total Kibes	
			Ave.		
Dense Mature	2,107	4.14	1.18	8.31	11,161	5,307
Open Mature	1,040	480	7.31	19.42	56.76	24,415	1,470
Dense Pole	808	95	20.00	0	80.00	1,900	900
Open Pole	75	149	176.00	0	176.00	26,224	224
Dense Xero.	280	345	6.17	.77	6.94	3,555	565
Open Xero.	285	178	1.14	11.52	80.77	5,635	460
Stream	7	175	64.87	0	64.87	11,388	182
Totals and Averages	9,552	1,465	15.57	3.8	83.37	81,083	13,008

TABLE NO. 38

White Pine Area Covered by
Extensive Reconnaissance
Pend Oreille T. P. A.
1927

Eradication Type	Acres
Dense Mature	200
Open Mature	85
Dense Pole	90
Open Pole	310
Dense Reproduction	0
Open Reproduction	360
Total	1,045

TABLE NO. 39

White Pine Area Covered by Intensive
and Extensive Reconnaissance
Pend Oreille T. P. A.
1927

Eradication Type	Acres
Dense Mature	9,407
Open Mature	1,555
Dense Pole	990
Open Pole	534
Dense Reproduction	565
Open Reproduction	820
Stream	182
Total	14,053

TABLE No. 34

Trails Fine Lyre Covered by Extensive Preconnaissance
Pond Creslje T. P. A.
1927

Vegetation Type	Acres
Dense Mature	203
Open Mature	65
Dense Pole	30
Open Pole	310
Dense Reproduction	0
Open Reproduction	365
Total	1,048

TABLE No. 35

Mule Pile Area Covered by Extensive and Preconnaissance
Pond Creslje T. P. A.
1927

Vegetation Type	Acres
Dense Mature	3,417
Open Mature	1,392
Dense Pole	589
Open Pole	884
Dense Reproduction	895
Open Reproduction	850
Stream	162
Total	14,979

E. Potlatch Timber Protective Association

1. Detailed location

Township 40 N Range 1 E; Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23; comprising parts of the drainages of Ruby Creek and the East Fork of Potlatch Creek.

Township 40 N Range 2 E; Sections 5 and 6; comprising part of the drainage of East Fork of Potlatch Creek.

Township 41 N Range 1 E; Section 9, 10, 11, 12, 13, 14, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36; comprising parts of the drainages of Rob's Creek and East Fork of Potlatch Creek. Includes a small portion of the St. Maries drainage lying near the divide between that river and the East Fork of Potlatch Creek.

Township 41 N Range 2 E; Sections 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33; comprising parts of the drainages of the East Fork of Potlatch Creek and the West Fork of Elk Creek near the divide between those streams.

Township 41 N Range 1 W; Sections 25, 26, 27, 28, 29, 30, 31, 32 33, 34, 35, 36, all in the drainage of Potlatch Creek.

Township 40 N Range 1 W; Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24; comprising parts of the drainages of the East Fork and Potlatch Creeks.

2. Results of work.

Tables No. 40, 41, 42, 43, 44, 45.

TABLE NO. 40

Percentage of the Potlatch Association
Covered by Reconnaissance

Total Area In Acres	Year	Area Worked in Acres	Per cent of Total
705,261	1924	6,204	0.88
	1925	3,920	0.56
	1926	39,164	5.55
	1927	62,400	8.85
Total Area Worked - Including 1927		111,633	15.84

K. Potlatch Timber Protective Association

1. Detailed Description

Township 40 N Range 1 E: Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23; comprising parts of the drainage of Big Creek and the East Fork of Potlatch Creek.

Township 40 N Range 2 E: Sections 5 and 6; comprising parts of the drainage of East Fork of Potlatch Creek.

Township 41 N Range 1 E: Sections 9, 10, 11, 12, 13, 14, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36; comprising parts of the drainages of Jacks Creek and East Fork of Potlatch Creek. Includes a small portion of the Elk Drainage lying near the divide between that river and the East Fork of Potlatch Creek.

Township 41 N Range 2 E: Sections 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33; comprising parts of the drainages of the East Fork of Potlatch Creek and the West Fork of Elk Creek near the divide between those streams.

Township 41 N Range 1 W; Sections 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, all in the drainage of Potlatch Creek.

Township 40 N Range 1 W; Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23; comprising parts of the drainages of the East Fork and Potlatch Creeks.

2. Results of work.

Tables No. 40, 41, 42, 43, 44, 45.

TABLE NO. 41

Acreage and Per cent of
Types Covered by Reconnaissance
Potlatch T. P. A.
1927

Land Division	Acres	Per cent
White Pine Type	33,916	54.36
Stream Type	944	1.51
Other Timber Types	15,656	25.09
Forest Land not Reproducing:		
Brush	10,080	16.15
Burn	0	0.00
Cutover	0	0.00
Non Forested Land:		
Cultivated	425	0.68
Meadow	1,339	2.15
Barren	40	0.06
Rock	0	0.00
Totals	62,400	100.00

TABLE NO. 42

Age Classes by Eradication Types
(White Pine Only)
Potlatch T. P. A., 1927

Eradication Types	Age Classes								Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature							45		45
Open Mature						16,834	3,048	2,645	22,527
Dense Pole									
Open Pole				269	580				849
Dense Repro.			10	55					65
Open Repro.	825	5,936	3,429	190					10,380
Totals	825	5,936	3,439	514	580	16,884	3,093	2,645	33,916

Table No. 41

Acreage and Per Cent of
Types Covered by Accumulations
Potlatch T. P. A.
1927

Land Titles	Acres	Per Cent
White Pine Type	23,916	54.36
Stream Type	944	1.51
Other Timber Types	17,678	35.09
Forest Land not Forested by:		
Trails	10,027	16.76
Ways	0	0.00
Cutover	0	0.00
Non Forested Land:		
Cultivated	278	0.61
Water	1,329	2.16
Barren	40	0.06
Bog	0	0.00
Totals	64,400	100.00

Table No. 42

Age Classes by Erosion Types
(White Pine Only)
Potlatch T. P. A., 1927

Erosion Types	Age Classes							Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200+	
Dense Mature							45	45
Open Mature							3,044	3,044
Dense Pole								
Open Pole					540			540
Dense Sapre.			10	75				85
Open Sapre.	525	1,178	1,450	150				3,303
Totals	525	1,178	1,460	225	540		3,089	7,017

TABLE NO. 43

Ribes per Acre on White Pine Type Covered
by
Intensive Reconnaissance
Potlatch Timber Protective Association
1927

Eradication Type	Ribes Free Acres	Ribes Present Acres	Average Number Ribes per Acre. lac.	visc.	pet.	iner.	Total	Total Ribes	Total Acres
Dense Mature	0	0	0	0	0	0	0	0	0
Open Mature	4,056	8,009	29.75	8.96	0	0	38.71	310,053	12,065
Dense Pole	0	0	0	0	0	0	0	0	0
Open Pole	390	0	0	0	0	0	0	0	390
Dense Reproduction	10	0	0	0	0	0	0	0	10
Open Reproduction	2,839	2,764	20.88	43.32	0	0	64.20	177,447	5,603
Stream	4	426	477.29	0	241.97	51.49	766.75	326,633	430
Totals and Averages	7,299	11,199	44.43	17.10	9.20	1.96	72.70	814,133	18,498

TABLE NO. 42

Tiffin Set Area of Burke Lea Area (Concluded)

by

Interstate Manufacturing Corporation

1931

Kind of Industry	Number of Establishments	Persons Engaged	Salaries	Wages	Cost of Materials	Value of Products	Value Added by Manufacture	Horsepower
Canning Factories	0	0	0	0	0	0	0	0
Cigar Factories	0	0	0	0	0	0	0	0
Cotton Gins	0	0	0	0	0	0	0	0
Cotton Textiles	0	0	0	0	0	0	0	0
Flour Mills	0	0	0	0	0	0	0	0
Furniture Factories	1	10	6,000	6,000	12,000	24,000	12,000	10
Ice Manufacturing	0	0	0	0	0	0	0	0
Knitting Mills	0	0	0	0	0	0	0	0
Lumber Mills	0	0	0	0	0	0	0	0
Meat Packing Plants	0	0	0	0	0	0	0	0
Men's Clothing	0	0	0	0	0	0	0	0
Millinery	0	0	0	0	0	0	0	0
Mineral Waters	0	0	0	0	0	0	0	0
Motion Picture Production	0	0	0	0	0	0	0	0
Motor Transportation	1	10	6,000	6,000	12,000	24,000	12,000	10
Oil Refining	0	0	0	0	0	0	0	0
Paper Manufacturing	0	0	0	0	0	0	0	0
Planing Mills	0	0	0	0	0	0	0	0
Printing and Publishing	0	0	0	0	0	0	0	0
Rock Crushing	0	0	0	0	0	0	0	0
Shoe Factories	0	0	0	0	0	0	0	0
Soft Drink Bottling	0	0	0	0	0	0	0	0
Stone Cutting	0	0	0	0	0	0	0	0
Tobacco Stemmeries	0	0	0	0	0	0	0	0
Wood Turning	0	0	0	0	0	0	0	0
Other Industries	0	0	0	0	0	0	0	0
Total	1	10	6,000	6,000	12,000	24,000	12,000	10

TABLE NO. 44

White Pine Area Covered by
Extensive Reconnaissance
Potlatch T. P. A.
1927

Eradication Type	Acres
Dense Mature	45
Open Mature	10,512
Dense Pole	0
Open Pole	459
Dense Reproduction	55
Open Reproduction	4,777
Stream	514
Total	16,362

TABLE NO. 45

White Pine Area Covered by Intensive
and Extensive Reconnaissance
Potlatch T. P. A.
1927

Eradication Type	Acres
Dense Mature	45
Open Mature	22,577
Dense Pole	0
Open Pole	349
Dense Reproduction	65
Open Reproduction	10,380
Stream	944
Total	34,360

TABLE NO. 44

White Pine Acres Covered by
Extensive Reconnaissance
Potlatch T. P. L.
1947

Classification Type	Acres
Dense Mature	65
Open Mature	13,258
Dense Pole	0
Open Pole	455
Dense Reproduction	55
Open Reproduction	4,777
Brush	814
Total	19,364

TABLE NO. 45

White Pine Acres Covered by Intensive
and Extensive Reconnaissance
Potlatch T. P. L.
1947

Classification Type	Acres
Dense Mature	46
Open Mature	24,577
Dense Pole	0
Open Pole	644
Dense Reproduction	66
Open Reproduction	10,247
Brush	884
Total	36,520

F. Priest Lake Timber Protective Association

1. Detailed location:

Trapper Creek

T. 64 N R. 4 W	Sections 21, 22, 27-34.
T. 63 N R. 4 W	Sections 4-9, 16-21, 28, 29.

Caribou Creek

T. 64 N R. 4 W	Sections 24-26, 35, 36.
T. 63 N R. 4 W	Sections 1-3, 10-15, 22-27, 33-36.
T. 62 N R. 4 W	Sections 3, 4, 9, 10.
T. 63 N R. 3 W	Sections 5-9, 16-21, 25-31.
T. 64 N R. 3 W	Sections 19, 30-32.

Upper Priest River

T. 64 N R. 5 W	Sections 25, 36.
T. 63 N R. 5 W	Sections 2, 3, 10-15.

Lion Head Creek

T. 62 N R. 3 W	Sections 1, 2, 10-15.
T. 62 N R. 2 W	Sections 6, 7.

Bear Creek

T. 61 N R. 4 W	Sections 1-3, 9-15, 21-24, 26-28, 34,35

Indian Creek

T. 61 N R. 3 W	Sections 1-6, 9-16, 21-23, 27-29, 34.

Hunt Creek

T. 60 N R. 4 W	Sections 1-3, 10-12, 14.
T. 60 N R. 3 W	Sections 10, 14, 15, 35.

Jack Pine Flats

T. 59 N R. 4 W	Sections 5, 8, 9, 16-21, 28-32.

Lost Creek

T. 59 N R. 3 W	Sections 2-11, 17, 18.

T. Priest Lake Timber Protective Association

I. Detailed Location:

Trapper Creek

T. 64 N R. 4 W Sections 21, 22, 27-34.
T. 63 N R. 4 W Sections 4-9, 16-21, 28, 29.

Caribou Creek

T. 64 N R. 4 W Sections 24-26, 35, 36.
T. 63 N R. 4 W Sections 1-3, 10-15, 22-27, 34-36.
T. 62 N R. 4 W Sections 1, 4, 9, 10.
T. 63 N R. 3 W Sections 4-9, 16-21, 28-33.
T. 64 N R. 3 W Sections 19, 30-32.

Upper Priest River

T. 64 N R. 5 W Sections 25, 36.
T. 63 N R. 5 W Sections 2, 3, 10-15.

Lion Head Creek

T. 62 N R. 3 W Sections 1, 2, 10-15.
T. 62 N R. 2 W Sections 6, 7.

Bear Creek

T. 61 N R. 4 W Sections 1-3, 9-15, 22-24, 27-34, 36.

Indian Creek

T. 61 N R. 3 W Sections 1-6, 9-16, 21-28, 32-36.

Hunt Creek

T. 60 N R. 4 W Sections 1-3, 10-12, 14.
T. 60 N R. 3 W Sections 10, 14, 15, 22.

Lake View Flats

T. 59 N R. 4 W Sections 3, 4, 9, 16-21, 28-33.

Lamb Creek

T. 59 N R. 3 W Sections 8-11, 17, 18.

North Fork East River

T. 59 N R. 3 W	Sections 14-16, 20-23, 26-36.
T. 58 N R. 4 W	Sections 1-6, 9-16.
T. 58 N R. 2 W	Sections 7-18.

Middle Fork East River

T. 58 N R. 3 W	Sections 7, 8, 17-19.

2. Results of work:

Tables No. 46, 47, 48, 49, 50, and 51:

TABLE NO. 46

Percentage of the Priest Lake Association Covered by Reconnaissance

Total Area Acres	Year	Area worked Acres	Per cent of Total
237,000	1924	18,632	7.862
"	1925	23,260	9.814
"	1926	37,945	16.012
"	1927	107,391	45.313
	To Date	187,228	79.000

T. 28 N. R. 3 W. Sections 14-16, 20-28, 32-36.
T. 29 N. R. 4 W. Sections 1-6, 9-16.
T. 28 N. R. 3 W. Sections 7-18.

T. 29 N. R. 3 W. Sections 7, 8, 17-18.

2. Brevity of work:

Tables No. 46, 47, 48, 49, 50, and 51

TABLE NO. 46

Percentage of the Tully Lake Association
Covered by Reconnaissance

Total Area Acres	Year	Area mapped Acres	Per cent of Total
277,000	1934	19,552	7.1+%
"	1935	252,480	9.1+%
"	1936	37,345	13.4+%
"	1937	107,401	43.3+%
	Total	417,258	73.000

TABLE NO. 47

Acreage and Per cent of Types
Covered by Reconnaissance
Priest Lake T. P. A.
1927

Land Division	Acres	Per cent
White Pine Type	32,383	30.155
Stream	1,328	1.237
Other Timber Types	50,770	47.276
Forest Land not Reproducing		
Brush	2,826	2.632
Burn	8,190	7.626
Cutover		
Non Forested Land		
Cultivated		
Meadow	287	.267
Barren	11,443	10.655
Swamp	164	.152
Totals	107,391	100.000

TABLE NO. 48

Age Classes by Wradication Types
(White Pine Only)
Priest Lake T. P. A., 1927

Wradication Types	Age Classes 0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total Acres
Dense Mature							4,603	335	4,938
Open Mature						41	8,530	363	8,934
Dense Pole			15	125	389	206			735
Open Pole			7	261	1,042	453			1,763
Dense Repro.	45	716	1,363	180					2,309
Open Repro.	1,042	10,282	2,143	237					13,704
Totals	1,087	10,998	3,533	803	1,431	700	13,133	698	32,383

Table No. 47

Acreage and Per cent of Types
Covered by Inventories
Priest Lake I. F. A.
1947

Land Division	Acres	Per cent
White Pine Type	[illegible]	30.185
Stream	1,264	1.837
Other Timber Types	50,771	47.276
Forest Land not Forested		
Brush	1,884	2.854
Burn	8,190	7.826
Quivver		
Non Forested Land		
Cultivated		
Meadow	317	.267
Barren	11,443	10.898
Swamp	164	.158
Totals	107,351	100.800

Figure No. 44

Acre Losses by Eradication Types
(White Pine Only)
Priest Lake F. F. A., 1947

Eradication Types	Acres Destroyed							Total Acres
	0- 10	11- 20	21- 30	31- 40	41- 50	51- 60	101- 200	
Dense Mature							4,607	4,607
Open Mature						41	1,230	1,271
Immature Pole				12	126	184	708	1,030
Upper Pole			7	261	1,048	490		1,806
Dense Layer.	45	774	1,124	150				2,093
Open Layer.	1,082	10,282	3,142	827				15,333
Total	1,087	10,958	3,283	803	1,483	700	13,133	32,339

TABLE NO. 49

Ribes per Acre on White Pine Type
Covered by
Intensive Reconnaissance
Priest Lake T. P. A.
1927

Eradication Type	Ribes Free Acres	Ribes Present				Total Ribes	Total Acres
		Acres	Ave. No. Ribes per A. lac.	visc.	Total		
Dense Mature	949	436	23.94	0	23.94	10,440	1,385
Open Mature	338	3,349	98.19	4.38	102.57	343,521	3,687
Dense Pole	26	237	3.00	0	3.00	711	263
Open Pole	508	358	141.75	0	141.75	50,745	866
Dense Repro.	989	103	101.71	0	101.71	10,476	1,092
Open Repro.	2,641	4,179	54.69	32.64	87.33	364,970	6,820
Stream	77	534	225.28	2.05	223.33	121,931	611
Totals and Averages	5,528	9,196	81.62	16.55	98.17	902,794	14,724

B. Costs

Tables No. [illegible], 53, 54.

TABLE NO. 50

White Pine Area Covered by
Extensive Reconnaissance
Priest Lake T. P. A.
1927

Eradication Type	Acres
Dense Mature	3,553
Open Mature	5,247
Dense Pole	472
Open Pole	897
Dense Reproduction	1,217
Open Reproduction	6,334
Stream	717
Total	18,987

TABLE NO. 51

White Pine Area Covered by Intensive
and Extensive Reconnaissance
Priest Lake T. P. A.
1927

Eradication Type	Acres
Dense Mature	4,938
Open Mature	8,934
Dense Pole	735
Open Pole	1,763
Dense Reproduction	2,309
Open Reproduction	13,704
Stream	1,328
Total	33,711

G. Costs;

Tables No. 52, 53, 54.

6. Goals:

Tables No. 88, 89, ...

TABLE NO. 52

Time Analysis, Man Days, 1927

Association	Travel	Sick	Office	Moving Camp	Rain	Fire	Reconn.	Training	Sundays & Holidays	Total Time
Clearwater	31	6	10	13	24	16	163	34	39	336
Coeur d'Alene	15	0	13	34	13	0	135	25	32	267
Pend Oreille	8	0	11	13	3	0	95	14	25	169
Potlatch	8	5	40	38	31	0	146	31	59	358
Priest Lake	41	9	11	19	48	0	207	42	70	447
Total	103	20	85	117	119	16	746	146	225	1,577

Table 80.—

Ohio Agricultural Experiment Station, 1927.

Varieties	Yield per acre	Rank	Lodging	Rank	Height	Rank	Maturity	Rank	Weight per bushel	Rank
Silver Chaff	23	10	1	1	34	10	13	10	32	10
Silver Queen	22	13	0	1	35	13	14	13	32	10
Red Chaff Bearded	23	10	0	1	34	13	14	13	32	10
Red Chaff Beardless	23	10	0	1	34	13	14	13	32	10
Early Ohio	23	10	0	1	34	13	14	13	32	10
Silver Mine	23	10	0	1	34	13	14	13	32	10
Average	23		0		34		14		32	

TABLE NO. 53

Cost of Training Period

Association	Subsistence	Equipment	Transportation of Men	Salaries	Total Cost	No. of Men	Cost per Man
Clearwater	$ 39.69		$ 27.71	$ 170.00	$ 237.40	4	$ 59.35
Coeur d'Alene	42.00			80.16	122.16	3	40.72
Pend Oreille	21.83		.66	52.70	75.19	2	39.32
Potlatch	47.53		5.47	111.89	164.89	4	41.22
Priest Lake	74.00		13.13	141.00	228.13	5	45.63
Total	$ 225.05		$ 46.97	$ 555.75	$ 827.77	18	$ 226.24

TABLE NO. 54

Cost of Reconnaissance

Association	Subsistence	Equipment	Transportation of Men	Salaries	Total Cost	Acres Worked	Cost per Acre
Clearwater	$ 303.78	$108.39	$ 68.73	$ 944.67	$ 1,425.57	60,160	.023
Coeur d'Alene	296.49	88.66	52.66	756.51	1,194.32	48,640	.025
Pend Oreille	154.69	47.36	10.66	470.53	683.24	46,400	.018
Potlatch	344.90	104.77	20.86	952.96	1,423.49	62,400	.023
Priest Lake	488.14	112.77	67.05	1,151.97	1,819.93	107,391	.017
Totals & Ave.	$1,588.00	$461.95	$ 219.96	$ 4,276.64	$ 6,546.55	324,991	.020

TABLE NO. 52

Cost of Maintenance Period

Description	Unit	Quantity	Rate	Amount
Excavation				
Earth work				
Concrete				
Brickwork				
Stone masonry				
Plastering				
Painting				
Carpentry				
Iron work				
Roofing				
Flooring				
Miscellaneous				
Total				

TABLE NO. 53

Cost of Maintenance

Description	Unit	Quantity	Rate	Amount
Excavation				
Earth work				
Concrete				
Brickwork				
Stone masonry				
Plastering				
Painting				
Carpentry				
Iron work				
Roofing				
Flooring				
Miscellaneous				
Total				

V. Collection of Data

Collection of all available data regarding the timber lands in the white pine area of north Idaho. This work consists in the examination of county records, Forest Service records, association records, and records of private owners, for information pertaining to ownership status and timber conditions of lands within the boundaries of each association and national forest. All of these data which are collected are placed in permanent form on card indexes and maps. This type of work is carried on in the winter.

VI. Summary

For the ease of ready reference the following composite tables have been compiled:

Reconnaissance Summary
TABLE NO. 1

Per Cent of Each Association and National Forest Covered by Reconnaissance

Unit	Area in Acres	Acres Worked 1923	Acres Worked 1924	Acres Worked 1925	Acres Worked 1926	Acres Worked 1927	Total Acres Worked to Date	% of Total Area Worked to Date
Clearwater T.P.A.	702,760		1,915	3,480	33,400	60,160	103,955	14.79
Coeur d'Alene T.P.A.	1,301,000*		786	6,911	46,240	48,640	102,577	7.88
Pend Oreille T.P.A.	865,800		3,522	4,640	33,280	46,400	87,842	10.15
Potlatch T.P.A.	705,261		6,204	3,920	39,164	62,400	111,688	15.84
Priest Lake T.P.A.	237,000		18,632	23,260	37,945	107,391	187,228	79.00
Coeur d'Alene N.F.	790,234			106,360	251,746		358,106	45.32
Kaniksu N.F.	657,620	5,510	22,106	25,310		147,182	200,108	30.43
Pend Oreille N.F.	874,738					241,479	241,479	27.61
St. Joe N. F.	867,450				37,850	426,860	464,710	53.57
Total	7,002,863	5,510	53,165	173,881	484,625	1,140,512	1,857,693	26.53

* Exclusive of National Forest Lands.

Recommendations Summary

Table No. 1

Total Acreage Recommended for Treatment by Method of Treatment

Unit	Area in Acres	Acres Method 1252	Acres Method 1255	Acres Method 1256	Acres Method 1257	Acres Method 1258	Total Acres Recommended	% of Total Acreage Recommended
Elsmere Lake	1,345			1,345			1,345	14.4
Camp Dittmer	1,640			1,640			1,640	17.5
Camp Otsego	1,040			1,040			1,040	11.1
Bodkin Point	1,204			1,204			1,204	12.9
Point Lake	1,320			1,320			1,320	14.1
Camp Dittmer	1,320			1,320			1,320	14.1
Total	9,369			9,369			9,369	100.0

* Excludes 30 acres of Natural Lake.

Reconnaissance Summary
TABLE NO. 2

Acreage and Per Cent of Types
Covered by Reconnaissance
1927

Land Division	Acres	Per Cent
White Pine Type	379,474	33.27
Stream	5,067	.44
Other Timber Types	532,705	46.71
Forest Land not Reproducing:		
Brush	74,945	6.57
Burn	101,245	8.88
Cutover	1,945	.17
Non Forested Land		
Cultivated	1,205	.11
Meadow	3,907	.34
Barren	28,331	2.49
Rock	11,638	1.02
Totals	1,140,512	100.00

Forestland Area Trends
TABLE NO. 1

Acreage and Per Cent of Types
Covered by Inventories
1977

Land Division	Acres	Per Cent
White Pine Type	[illegible]	[illegible]
Spruce	[illegible]	[illegible]
Other Timber Types	[illegible]	[illegible]
Forest Land Not Productive:		
Brush	[illegible]	[illegible]
Burn	[illegible]	[illegible]
Cleaver	[illegible]	[illegible]
Non Forested Land		
Cultivated	[illegible]	[illegible]
Other	[illegible]	[illegible]
Barren	[illegible]	[illegible]
Rock	[illegible]	[illegible]
Total	[illegible]	[illegible]

Reconnaissance Summary
TABLE NO. 3

Age Classes by Eradication Types
(White Pine Only)
1927

Eradication Type	Age Classes								Total Acres
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	
Dense Mature					90	2,479	24,266	1,230	28,065
Open Mature						38,080	112,952	39,003	190,035
Dense Pole			15	1,767	1,670	459	50		3,961
Open Pole			172	10,202	14,746	11,411			36,531
Dense Reproduction	75	2,623	7,782	1,050					11,530
Open Reproduction	45,549	30,331	32,546	1,416					109,842
Totals	45,624	32,954	40,515	14,435	16,506	52,429	137,268	40,233	379,964

| | | |

Reconnaissance Summary
TABLE NO. 4

Ribes per Acre on White Pine
Type Covered by Intensive Reconnaissance
1927

Eradication Type	Ribes Free		Ribes Present				Total Acres
	Acres	Per cent	Acres	Per cent	Ave. No. Ribes per A.	Total Ribes	
Dense Mature	14,787	74.19	5,144	25.81	12.10	62,258	19,931
Open Mature	22,593	27.35	60,014	72.65	64.91	3,895,329	82,607
Dense Pole	1,390	47.23	1,553	52.77	16.12	35,036	2,943
Open Pole	3,848	31.54	8,353	68.46	116.27	971,223	12,201
Dense Reproduction	3,191	45.87	3,766	54.13	9.21	34,724	6,957
Open Reproduction	12,198	25.10	36,400	74.90	93.57	3,406,024	48,598
Stream	131	3.68	3,424	96.32	458.09	1,568,493	3,555
Totals and Averages	58,138	32.88	118,654	67.12	83.97	9,963,087	176,792

Reconnaissance Summary
TABLE NO. 5

White Pine Area Covered
by
Extensive Reconnaissance
1927

Predication Type	Acres
Dense Mature	8,134
Open Mature	107,423
Dense Pole	1,013
Open Pole	24,230
Dense Reproduction	4,573
Open Reproduction	61,244
Stream	1,512
Total	208,239

Reconnaissance Summary
TABLE NO. 6

White Pine Area Covered by
Intensive and Extensive Reconnaissance
1927

Predication Type	Acres
Dense Mature	25,065
Open Mature	190,035
Dense Pole	3,961
Open Pole	35,331
Dense Reproduction	11,530
Open Reproduction	104,542
Stream	5,067
Total	355,031

Tabelle Nr. 5

Tabelle über Leistungen
von
Einwohner-Versicherungen
1917

Versicherungs-Firma	Leistungen
Phönix, Berlin	1,234,567
Germania, Stettin	987,654
Victoria, Berlin	876,543
Nordstern, Berlin	765,432
Aachen & Münchener	654,321
Colonia, Köln	543,210
Thuringia, Erfurt	432,109
Sonstige	321,098
Total	5,814,934

Tabelle No. 6

Tabelle über Leistungen von
Lebensversicherungs-Gesellschaften
1917

Versicherungs-Firma	Leistungen
Lebensversicherungsbank, Gotha	2,345,678
Victoria, Berlin	1,876,543
Germania, Stettin	1,654,321
Nordstern, Berlin	1,432,109
Aachen & Münchener	1,209,876
Colonia, Köln	987,654
Thuringia, Erfurt	765,432
Sonstige	543,210
Total	11,814,823

Reconnaissance Summary
TABLE NO. 7
Time Analysis Summary in Man Days
1927

Unit	Reconn-aissance	Train-ing	Travel	Moving Camp	Office	Rain	Sick	Sundays & Holidays	Fire	Total Time
Clearwater T.P.A.	163	34	31	13	10	24	6	39	16	336
Coeur d'Alene T.P.A.	135	25	15	34	13	13	0	32	0	267
Pend Oreille T.P.A.	95	14	8	13	11	3	0	25	0	169
Potlatch T.P.A.	146	31	8	38	40	31	5	59	0	358
Priest Lake T.P.A.	207	42	41	19	11	48	9	70	0	447
Kaniksu N. F.	157	18	11	59	26	23	0	53	0	347
Pend Oreille N. F.	334	61	48	41	40	17	0	97	0	638
St. Joe N. F.	370	43	37	117	68	63	1	102	14	815
Totals	1,607	268	199	334	219	222	21	477	30	3,377

Basketball Statistics

TEAM NO. 2

Three Quarters Completed in Each Game

1947

Name	Goals	Free Throws	Fouls	Total Points
Sanders, T.F.	16	18	4	50
Connor, Wayne T.F.A.	12	8	3	32
Bullock, Ted T.F.A.	9	5	2	23
Wood, Phillip T.F.A.	8	7	1	23
Brent, Lance T.F.A.	7	4	3	18
Hamilton, J. T.	5	3	2	13
Ford, Carlton W.T.	4	2	1	10
Mr. Jones T.F.	2	1	0	5
Substitutes	1	0	0	2
Total	64	48	16	176

Reconnaissance Summary

TABLE NO. 8

Cost of Reconnaissance

Cost of Training Period

1927

Unit	Subsistence	Equipment	Transportation of Men	Salaries	Total Cost	No. of Men	Cost per Man
Clearwater T.P.A.	$ 39.69		$ 27.71	$ 170.00	$ 237.40	4	$ 59.35
Coeur d'Alene T.P.A.	42.00			80.16	122.16	3	40.72
Pend Oreille T.P.A.	21.83		.66	52.70	75.19	2	39.32
Potlatch T.P.A.	47.53		5.47	111.89	164.89	4	41.22
Priest Lake T.P.A.	74.00		13.13	141.00	228.13	5	45.63
Kaniksu N. F.	20.90			27.00	47.90	3	15.97
Pend Oreille N. F.	109.33		16.08	193.35	318.76	8	39.84
St. Joe N. F.	63.75			130.51	194.26	9	21.58
Totals and Averages	$ 419.03		$ 63.05	$ 906.61	$1,388.69	38	$ 36.54

Reconnaissance Summary

TABLE NO. 8

Cost of Training Period

1927

Unit	Subscription	Qualification	Transportation of Men	Material	Total Cost	No. of Men	Cost per Man
Clearwater T.F.A.	$ 39.69		$ 27.70	$ 170.00	$ 237.45	4	$ 59.36
Dover Airplane T.F.A.	42.00			96.16	138.16	3	46.72
Pond Orville T.F.A.	81.85		.85	52.70	76.15	2	38.32
Phillips T.F.A.	47.55		5.47	111.89	164.39	4	41.85
Trout Lake T.F.A.	74.00		12.15	141.00	142.15	6	46.84
Dowling R. W.	80.40			57.80	42.80	3	12.47
Pond Orville R. T.	105.35		16.05	180.00	116.70	7	75.84
St. Joe R.T.	82.75			180.81	134.25	3	71.68
Totals and Averages	$ 419.05		$ 61.05	$ 208.81	$1,248.89	36	$ 58.54

Reconnaissance Summary
TABLE NO. 9

Cost of Reconnaissance
1927

Unit	Subsis-tence	Equip-ment	Transporta-tion of Men	Salaries	Total Cost	Acres Worked	Cost per Acre
Clearwater T.P.A.	$ 303.78	$108.39	$ 68.73	$ 944.67	$ 1,425.57	60,160	$ .024
Coeur d'Alene T.P.A.	296.49	88.66	52.66	756.51	1,194.32	48,640	.025
Pend Oreille T.P.A.	154.69	47.36	10.66	470.53	683.24	46,400	.018
Potlatch T.P.A.	344.90	104.77	20.36	952.96	1,423.49	62,400	.023
Priest Lake T.P.A.	488.14	112.77	67.05	1,151.97	1,819.93	107,391	.017
Kaniksu N. F.	437.10	37.94	29.94	807.00	1,311.98	147,182	.009
Pend Oreille N. F.	598.86	170.61	47.72	2,060.22	2,877.41	241,479	.012
St. Joe N. F.	1,226.50	113.81	82.11	2,520.90	3,943.32	426,860	.009
Totals and Averages	$3,850.46	$784.31	$379.73	$9,664.76	$14,679.26	1,140,512	$ .013

Geographic Summary

Table of Contents

1947

Item #	Number served	Population	Total cost	Cost per item
Quarterly report 1947	1,234	56,789	12,345.67	10.00
Annual summary 1947	2,345	67,890	23,456.78	10.00
Semi-annual review 1947	3,456	78,901	34,567.89	10.00
Monthly bulletin 1947	4,567	89,012	45,678.90	10.00
Weekly digest 1947	5,678	90,123	56,789.01	10.00
Daily briefing 1947	6,789	91,234	67,890.12	10.00
Special report 1947	7,890	92,345	78,901.23	10.00
Urgent memo 1947	8,901	93,456	89,012.34	10.00
Routine letter 1947	9,012	94,567	90,123.45	10.00
Final notice 1947	10,123	95,678	101,234.56	10.00

BLISTER RUST CONTROL WORK IN WASHINGTON
1927

The following is the memorandum of understanding under the terms of which the work in Washington is organized:

MEMORANDUM OF UNDERSTANDING
between
THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and the
WASHINGTON STATE DEPARTMENT OF AGRICULTURE
relative to
Cooperative White Pine Blister Rust Control Work in Washington.
Effective July 1, 1927.

---oOo---

A. THE BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. THE WASHINGTON STATE DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease; and

(3) Undertake such destruction of white pine or Ribes in Washington and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work.

MEMORANDUM OF UNDERSTANDING

between

THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE

and the

WASHINGTON STATE DEPARTMENT OF AGRICULTURE

relative to

Cooperative White Pine Blister Rust Control Work in Washington.

Effective July 1, 1927.

---oOo---

A. THE BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and supervise by furnishing technical leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. THE WASHINGTON STATE DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, according for white pine blister rust and inspecting nurseries for this disease; and

(3) Undertake such destruction of white pine or Ribes in Washington and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work.

C. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated by either party by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Washington;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticised by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for host plants destroyed in control work;

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $13,000 to the support of this cooperative work, and the Washington State Department of Agriculture shall contribute in value approximately $8,000; thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:	Signature:
July 25, 1927	(s.) Erle J. Barnes Director, Washington State Department of Agriculture.
Sept. 15, 1927	(s.) Wm. A. Taylor, Chief, Bureau of Plant Industry.

C. IS IT NECESSARY ALTER that:

(1) This memorandum may be terminated by either party by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Washington;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts thereof shall be criticized by the cooperating parties before publication; and all form letters, bulletins and other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in connection for host plants destroyed in control work;

(6) For the fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $12,000 to the support of this cooperative work, and the Washington State Department of Agriculture shall contribute in value approximately $3,000: thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:

July 25, 1927

(s.) Wm. A. Taylor,

Chief, Bureau of Plant Industry.

Date:

(s.) Fred L. Boner,

Director, Washington State Department of Agriculture.

WASHINGTON BLACK CURRANT ERADICATION

1927

by

B. A. Ganoung and G. A. Felch, Agents.

Work was begun in Spokane on May 19th with two men. On June 15 three more men were added. B. A. Ganoung was left in charge of the work on July 29th. Chelan County, the last one in eastern Washington, was completed on September 2.

Tabulated results are as follows:

TABLE NO. 1

Location	Plantings	Bushes	Places Scouted: Towns	Places Scouted: Country	Man Days	Miles traveled in personally Owned Cars
City of Spokane	83	301	30,000	---	67	---
Outside of City*	17	111	---	1,000	24	---
Spokane County, Total	100	412	30,000	1,000**	91	1,722
Yakima County	23	117	5,000	2,394	89½	2,630
Kittitas County	40	201	4,309	1,272	86	2,116
Chelan County	26	103	3,535	2,357	90½	4,196
Totals	189	833	42,844	6,923	327	10,664

* Eight plantings containing 86 bushes were the result of running down 20 previously located but not eradicated plantings in different parts of the County. The other 8 plantings with 25 bushes were found in a strip one mile wide around the city, and in a small area near Opportunity, Washington. The County, except the city, had been previously scouted in 1923.

** An approximation but not based on an actual count.

Methods

The County was the unit worked at a time. Maps were secured from the County Engineer's office, and in thickly settled areas these were supplemented with ownership maps. In towns, plats were obtained from the City Engineer's office.

The towns were scouted on foot by men working singly or in pairs. In the country an area marked by natural boundaries would be assigned to two men with a car who were held responsible for scouting every place within that area.

Automobile Survey Statistics

by

B. A. Genoung and O. A. Telch, Agents.

Work was begun in Spokane on May 15th with two men. On June 15 three more men were added. B. A. Genoung was left in charge of the work on July 25th. Chelan County, the last one in eastern Washington, was completed on September 2.

Tabulated results are as follows:

Table No. 1

Location	Number of Parking Places	Places Counted		Man Hours Spent in Counting Cars	Miles Traveled by Automobile
		Cars	People		
City of Spokane	82	301	760,000	67	---
Suburbs of City*	17	111	---	24	---
Spokane County, Total	106	412	1,040,000**	91	1,712
Chelan County	23	117	2,940	3hr.	3,456
Kittitas County	42	201	4,520	8h.	3,116
[illegible]	43	103	1,291	10h.	4,196
Totals	189	833	21,041	137	10,484

Eight plantings containing 86 buses were the result of running down 20 previously located but not eradicated plantings in different parts of the County. The other 8 plantings with 25 buses were found in a strip one mile wide around the city, and in a small area near Opportunity, Washington. The County, except the city, had been previously counted in 1923.

** An approximation but not based on an actual count.

Methods

The County was the unit worked at a time. Maps were secured from the County Engineer's office, and in thickly settled areas these were supplemented with ownership maps. In towns, plats were obtained from the City Engineer's office.

The towns were counted on foot by men working singly or in pairs. In the country an area marked by natural boundaries would be assigned to two men with a car who were held responsible for counting every place within that area.

Some very thinly settled regions were scouted by one man alone in a car.

The cars were personally owned and reimbursement was at the rate of 7¢ per mile.

Every farm scouted was marked on the map with a dot. These dots were then counted and compared with the U. S. Census data for that County. This tends to more careful scouting, provides a means of comparing the work of different crews, and gives a basis for estimating time required in other counties.

In cities the number of places scouted was figured from the population.

The estimate of man days required in some counties and towns based on the previous years data were in error as much as 200%, but the entire summer work was within 25% of the estimate.

The duties of the supervisor were to get out publicity, interview county agents and state horticultural inspectors, secure maps, allot certain areas to each two man crew, check the work of the crew, do extensive scouting in areas particularly unfavorable to the growing of black currants, and talk with owners who had at first refused to permit their bushes to be removed.

By locating black currants ahead of the crew, and by rescouting behind them a check was made on their efficiency. It appears that even with the best of scouts there will not be a 100% eradication. A few people will intentionally or otherwise state that they have no black currant bushes, and occasionally a bush will be overlooked.

The members of the crew furnished their own camp equipment, and camped in the tourist parks or other places close to the area being scouted. This arrangement works out very well and is more satisfactory than staying at hotels.

In contact with black currant owners the policy was to sell them on the reason why their black currants should be removed. If the first man did not succeed in this he left the owner some bulletins and reported the case to the supervisor who would call a day or two later.

All bushes found were eradicated, and it was not necessary to call on the state inspectors who had offered to help in cases of absolute refusal.

Publicity

Publicity was secured through the newspapers, use of bulletins, posters, window displays, and in Spokane an automatic slide projector was used quite effectively.

Some very thinly settled regions were scouted by one man alone in a car.

The cars were personally owned and reimbursement was at the rate of 7¢ per mile.

Every farm scouted was marked on the map with a dot. These dots were then counted and compared with the U. S. Census data for that County. This tends to more careful scouting, provides a means of comparing the work of different crews, and gives a basis for estimating time required in other counties.

In cities the number of places scouted was figured from the population.

The estimate of man days required in some counties and towns based on the previous years data were in error as much as 200%, but the entire summer work was within 10% of the estimate.

The duties of the supervisor were to get out publicity, interview county agents and state horticultural inspectors, secure maps, allot certain areas to each two man crew, check the work of the crew, do extensive scouting in areas particularly unfavorable to the growing of black currants, and talk with owners who had at first refused to permit their bushes to be removed.

By locating black currants ahead of the crew, and by recounting behind them a check was made on their efficiency. It appears that even with the best of scouts there will not be a 100% eradication. A few people will intentionally or otherwise state that they have no black currant bushes, and occasionally a bush will be overlooked.

The members of the crew furnished their own camp equipment, and camped in the tourist parks or other places close to the area being scouted. This arrangement works out very well and is more satisfactory than staying at hotels.

In contact with black currant owners the policy was to tell them on the reason why their black currants should be removed. If the first man did not succeed in this he left the owner some bulletins and reported the case to the supervisor who would call a day or two later.

All bushes found were eradicated, and it was not necessary to call on the state inspectors who had offered to help in cases of absolute refusal.

Publicity was secured through the newspapers, use of bulletins, posters, window displays, and in Spokane an automatic slide projector was used quite effectively.

The amount of interest and cooperation shown varied directly with the amount of publicity. In Spokane where the most publicity was received, owners were phoning in the location of their bushes at the rate of several a day even though, through an oversight, no phone number had appeared in many of the newspaper articles.

Letters were sent to some of the owners thanking them for giving up their bushes, and asking them to pull or report any sprouts that appeared.

Rechecking

In practically every case where rechecking has been done, missed plantings and sprouts have been found. Some very limited work has shown a rate of resprouting as high as 10%. However, the plantings examined were too few to justify taking this as a fair average.

The 8 plantings with 25 bushes found in a mile wide strip around the City of Spokane and in a small area near Opportunity, all of which had been scouted in 1923, indicates one or a combination of three things. Plantings were missed, bushes have been planted, or there has been considerable resprouting either naturally or with some help.

Plans had been made for the rechecking of Pend Oreille County, and forms were made upon which was transferred the data from the original eradication cards. But, due to the urgency of other work, no rechecking was done.

Black Currant Data

Average number of bushes per planting	4.4
Number of places scouted for each planting found	263
Miles of car travel for each planting found	56
Average number of man hours used for each planting eradicated	13.8

Costs of Eradication

Cost per planting eradicated	$ 21.07
Cost per bush eradicated	4.79
Cost per place scouted	.08
Total cost of eradication	3,983.59

Due to more bushes being found, and more places scouted, the cost per planting, per bush, and of each place scouted is much less than in 1926.

Due to more brushes being found, and more places scouted, the cost per planting, per brush, and of each place scouted is much less than in 1936.

Costs of Eradication

Total cost of eradication	$3,982.89
Cost per place scouted	.08
Cost per brush eradicated	4.79
Cost per planting eradicated	$ 21.07

Average number of man hours used for each planting eradicated	13.8
Miles of car travel for each planting found	58
Number of places scouted for each planting found	2858
Average number of brushes per planting	4.4

Plans Carried Out

Plans had been made for the rechecking of Pend Oreille County, and forms were made upon which was transferred the data from the original eradication cards. But, due to the urgency of other work, no rechecking was done.

The City of Spokane and in a small area near Deer Park, all of which had been scouted in 1933, indicates one or a combination of three things. Plantings were missed, brushes have been planted, or there has been considerable resprouting either naturally or with some help.

The 8 plantings with 25 brushes found in a mile wide strip around the City of Spokane and in a small area near Deer Park, all of which had been scouted in 1933, indicates one or a combination of three things. Plantings were missed, brushes have been planted, or there has been considerable resprouting either naturally or with some help.

Plans had been made for the rechecking of Pend Oreille County, and forms were made upon which was transferred the data from the original eradication cards. But, due to the urgency of other work, no rechecking was done.

Plans Carried Out

Average number of brushes per planting.....4.4
Number of places scouted for each planting found.....2858
Miles of car travel for each planting found.....58
Average number of man hours used for each planting eradicated.....13.8

Costs of Eradication

Cost per planting eradicated.....$ 21.07
Cost per brush eradicated.....4.79
Cost per place scouted.....08
Total cost of eradication.....3,982.89

Due to more brushes being found, and more places scouted, the cost per planting, per brush, and of each place scouted is much less than in 1936.

TABLE No. 2

Distribution of Costs

Name	Salary			Expenses						Grand Total
				Subsistence at $3 per diem		Auto mileage at 7¢ per mile		Miscellaneous		
	Rate per Month	Period	Total	Period	Total	Period	Total	Transportation	Supplies etc	
H. P. Bachus	$100	6/15 - 9/2	$ 260.00	7/1 - 9/2	$ 190.50			$	$	$ 450.50
G. A. Felch	150	5/16 - 9/3	540.00	7/1 - 7/31	90.75	5/16 - 7/31	106.26	15.75		752.76
E. A. Ganoung	100	5/16 - 9/8	373.00	7/6 - 9/8	173.25	5/16 - 9/8	271.32		1.45	819.02
G. N. Jones	100	6/15 - 9/8	260.00	7/1 - 9/8	179.80	7/28 - 9/8	121.91	.90		562.61
E. G. Macomber	100	6/15 - 8/31	253.33	7/1 - 8/31	185.25					438.58
C. C. Peterson	130	5/18 - 5/31	56.33							56.33
H. E. Whidden	100	6/15 - 9/8	280.00	7/1 - 9/8	192.75	6/15 - 9/8	376.04			848.79
Miscellaneous		6/15 - 9/8						*25.00	30.00	55.00
Total			$2,022.66		$1,013.30		$875.53	$41.65	$31.45	$3,983.59

*Boat hire - one day

Table No. 4

Distribution of Goods

Name	Date paid wants	Period	Total	Salary	Period	Total	Expenses	Period	Total	Grand Total
					Distance of 50 per day			Rate mileage of 7¢ per mile		
							Miscellaneous			
							Transportation	Supplies etc		
C. F. Dunne	1/10	8/15 - 9/3	180.00		7/1 - 7/15	180.00				180.00
A. A. Field	1/10	8/19 - 9/3	240.00		7/1 - 7/15	90.75	8/15 - 7/1	105.00	12.75	195.75
A. A. Freeman	1/10	8/16 - 9/15	270.00		7/1 - 8/15	172.50	8/15 - 7/1	171.	1.50	343.50
C. C. Jones	1/10	8/16 - 9/6	180.00		7/1 - 7/15	172.50	8/15 - 7/1	171.	.75	343.25
C. C. Macomber	1/10	8/15 - 9/23	180.00		7/1 - 8/15	180.00				180.00
C. C. Peterson	1/10	8/15 - 9/23	240.00							
C. C. Hughes	1/10	8/15 - 9/4	180.00		7/1 - 8/15	180.75	8/15 - 7/1	171.00		351.75
Miscellaneous		8/15 - 9/5								
Total										

Recommendations

1 - It would be a good policy, particularly in the northeastern counties of this State, to have some knowledge of how many black currants remain or have come in since eradication. Some rechecking could be done in this region in connection with scouting for the disease, and, if done at this time, there would also be the opportunity of getting more information on the susceptibility of Ribes nigrum.

The rechecking forms with the data of previous eradications on them for Pend Oreille County should be used in any rechecking done in that county.

2 - Since the work of each mumber of the crew was very satisfactory they should be employed for any similar positions.

Recommendations

1 - It would be a good policy, particularly in the northeastern counties of this state, to have some knowledge of how many black cattle ticks remain or have come in since eradication. Some technical could be done in this region in connection with scouting for the disease, and if done at this time, there would also be the opportunity of getting more information on the susceptibility of Niger cattle.

The technical term with the data of previous eradications on them for Tend Drazile County should be used in any technical term in that county.

3 - Since the term of each member of the crew was very satisfactory they should be employed for any similar positions.

CONTROL RECONNAISSANCE IN WASHINGTON

by
M. C. Riley,
Junior Forester.

I. Definition and Purpose of Work

This is the same as in the Annual Report for reconnaissance in Idaho.

II. Methods of Work

The general methods of performing reconnaissance and method of taking data were the same as discussed in the Annual Report for reconnaissance in Idaho.

The only records available to be used as a basis for reconnaissance in northeastern Washington were the records in the offices of the County Assessors for the various counties.

At the very beginning of the work it became evident that these records were not reliable so it became necessary to do a great deal of extensive work.

The crew spent the majority of its time in simply locating white pine areas rather than in attempting very much intensive reconnaissance.

The difference in methods of work from last year and the personnel and method of training has been covered in the Annual Report for reconnaissance in Idaho.

III. Work Performed and Results Obtained

A. General Location of Work

All possible white pine sites were covered on the area extending from the International Boundary south to the south line of Township 32 north and from the Pend Oreille River on the east to the divide between the Pend Oreille River drainage and the Columbia River drainage.

A small isolated area of nine sections was also examined on the American Fork of Sheep Creek on the Colville National Forest.

B. Northeastern Washington

1. Detailed location.

by

Major Forester.

I. Objective and Purpose of Work

This is the same as in the Annual Report for reconnaissance in Idaho.

II. Methods of Work

The general methods of performing reconnaissance and method of taking data were the same as discussed in the Annual Report for reconnaissance in Idaho.

The only records available to be used as a basis for reconnaissance in Northeastern Washington were the records in the offices of the County Assessors for the various counties.

At the very beginning of the work it became evident that these records were not reliable so it became necessary to do a great deal of extensive work.

The crew spent the majority of its time in simply locating white pine areas rather than in attempting very much intensive reconnaissance.

The difference in methods of work from last year and the personnel and method of training has been covered in the Annual Report for reconnaissance in Idaho.

III. Work Performed and Results Obtained

A. General Location of Work.

All possible white pine sites were covered on the area extending from the International Boundary south to the south line of Township 32 North and from the Pend Oreille River on the east to the divide between the Pend Oreille River drainage and the Columbia River drainage.

A small isolated area of nine sections was also examined on the American Fork of Sheep Creek on the Colville National Forest.

B. Reconnaissance Results

1. Detailed Locating.

T. 40 N.	R. 43 E.	Willamette Meridian		All of township west of the Pend Oreille River.
T. 40 N.	R. 38 E.	"	"	Sec's 1-3, 10-15, 24 all inclusive.
T. 39 N.	R. 43 E.	"	"	All of township west of the Pend Oreille River.
T. 38 N.	R. 43 E.	"	"	All of township west of the Pend Oreille River.
T. 38 N.	R. 42 E.	"	"	Entire township.
T. 37 N.	R. 42 E.	"	"	Entire township.
T. 36 N.	R. 42 E.	"	"	Entire township.
T. 35 N.	R. 42 E.	"	"	E½ of township.
T. 34 N.	R. 43 E.	"	"	Entire township.
T. 34 N.	R. 42 E.	"	"	E ½ of township.
T. 33 N.	R. 43 E.	"	"	Entire township.
T. 33 N.	R. 42 E.	"	"	E ½ of township.
T. 32 N.	R. 44 E.	"	"	All of township west of Pend Oreille River.
T. 32 N.	R. 42 E.	"	"	E ½ of township.
T. 32 N.	R. 43 E.	"	"	Entire township.
T. 31 N.	R. 42 E.	"	"	E ½ of township.
T. 31 N.	R. 44 E.	"	"	Entire township.
T. 30 N.	R. 44 E.	"	"	Entire township.

2. Results of work

Table No. 1

Per cent of Types Covered by Reconnaissance
Northeastern Washington
1927

Type	Acres	Per Cent
White Pine	31,179	10.84
Stream	284	.10
Other Timber	174,565	60.69
Forest Land Not Reproducing		
Burn	55,959	19.42
Non-Forest Land		
Meadow	24,386	8.47
Cultivated	1,374	.48
Total	287,644	100.00

T. 40 N.	R. 43 E.	Willamette Meridian	All of township west of the Feed Oroville River.
T. 40 N.	R. 38 E.	"	Sec's 1-3, 10-15, 24 all inclusive.
T. 39 N.	R. 43 E.	"	All of township west of the Feed Oroville River.
T. 38 N.	R. 43 E.	"	All of township west of the Feed Oroville River.
T. 38 N.	R. 42 E.	"	Entire township.
T. 37 N.	R. 42 E.	"	Entire township.
T. 36 N.	R. 42 E.	"	Entire township.
T. 35 N.	R. 42 E.	"	$\frac{1}{2}$ of township.
T. 34 N.	R. 43 E.	"	Entire township.
T. 34 N.	R. 42 E.	"	E $\frac{1}{2}$ of township.
T. 33 N.	R. 42 E.	"	Entire township.
T. 33 N.	R. 42 E.	"	E $\frac{1}{2}$ of township.
T. 32 N.	R. 44 E.	"	All of township west of Feed Oroville River.
T. 32 N.	R. 42 E.	"	E $\frac{1}{2}$ of township.
T. 32 N.	R. 43 E.	"	Entire township.
T. 31 N.	R. 42 E.	"	E $\frac{1}{2}$ of township.
T. 31 N.	R. 44 E.	"	Entire township.
T. 30 N.	R. 44 E.	"	Entire township.

2. Results of work

Table No. 1

Type	Acres	Per Cent
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table No. 2

Age Classes by Eradication Types (White Pine Only)
Northeastern Washington, 1927

Eradication Type	Age Classes by Eradication Types								
	0-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total
D. M.									
O. M.							6,394	894	7,288
D. P.									
O. P.				6,732	398				7,130
D. R.			753						753
O. R.	3,258	8,597	4,153						16,008
Total	3,258	8,597	4,906	6,732	398		6,394	894	31,179

Table No. 3

Ribes per Acre on White Pine Type
Covered by Intensive Reconnaissance
Northeastern Washington, 1927

Eradication Type	Ribes Free Acres	Ribes Present				Total Ribes	Total Acres
		Acre	Ave.No.Ribes per Acre lac.	visco.	Total		
D. M.							
O. M.	324	516	67.65		67.65	34,908	840
D. P.							
O. P.	662	779	78.25	19.33	97.58	76,012	1441
D. R.							
O. R.	789	2347	58.94	55.92	114.86	269,581	3136
Stream	106	178	51.04	10.84	361.88	64,416	284
Total	1,881	3820	77.67	38.81	116.48	444,917	5,701

Table No. 4

White Pine Area Covered by
Extensive Reconnaissance
Northeastern Washington, 1927

Eradication Types	Acres
Dense Mature	
Open Mature	6,448
Dense Pole	
Open Pole	5,689
Dense Reproduction	753
Open Reproduction	12,872
Stream	
Total	25,762

Table No. 1

Age Changes by Qualifying Types (Late Time Only)
Northwestern Penitentiary, 1927

Qualifications	Age Classes by Medication Types							
Type	0-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
A. 1.								
A. 2.								
B. 1.								
B. 2.								
C. 1.								
C. 2.								
D. 1.								
D. 2.								
Total								

Table No. 2

Rings Per Acre on Built Time Type
Covered by Intensive Research Program
Northwestern Expansion, 1927

Medication Type	Rings Per Acre				Total Rings Acre
	Type A	Type B	Type C	Type D	
A. 1.					
A. 2.					
B. 1.					
B. 2.					
C. 1.					
C. 2.					
D. 1.					
D. 2.					
Total					

Table No. 3

Rings Per Acre on Built Time Type
Covered by Intensive Research Program
Northwestern Expansion, 1927

Medication Type	Rings Per Acre				Total Rings Acre
	Type A	Type B	Type C	Type D	
A. 1.					
A. 2.					
B. 1.					
B. 2.					
C. 1.					
C. 2.					
D. 1.					
D. 2.					
Total					

Table No. 4

Built Time Area Covered by
Qualitative Research Program
Northwestern Expansion, 1927

Expansion Type	Acres
Type A	
Type B	
Type C	
Type D	
Other Built	
Other Expansion	
Other Medication	
Total	

Table No. 5

White Pine Area Covered by
Intensive and Extensive Reconnaissance
Northeastern Washington, 1927

Predicition Type	Acres
Dense Mature	
Open Mature	7,288
Dense Pole	
Open Pole	7,130
Dense Reproduction	753
Open Reproduction	16,008
Stream	284
Total	31,463

C. Costs

This has been fully explained in the Annual Report for reconnaissance in Idaho.

Table No. 6

Time Analysis
Northeastern Washington - 1927

Travel	Sick	Office	Moving Camp	Rain	Fire	Recon-nais-sance	Training	Sundays and Holidays	Total
4		5	3	2		99	8	16	136

Table No. 7

Training Costs
Northeastern Washington - 1927

Subsis-tence	Equip-ment	Trans. of men	Salaries	Total	No. of men	Cost per man
$10.60			$ 26.08	$36.28	2	$18.14

Table No. 5

Table Five Area Covered by
Intensive and Extensive Reconnaissance
Archaeology Survey, 1957

Description Type	Acres
Dense Midden	
Open Midden	7,250
Open Site	
Open Mole	7,150
Dense Reproduction	750
Open Reproduction	6,400
Stream	250
Total	21,150

5. Costs

Table No. 6

Time Analysis
Archaeology Survey - 1957

Travel	Site Office	Camp	Driving	Mapping	Aerial Photo	Surface Collecting	Sherd Washing	Total
4	5	3	2	80	0	12		106

Table No. 7

Typing Costs
Archaeology Survey - 1957

Description	Typing Hours	Typing Cost	Material	Total	No. of Copies	Cost per Copy
Report	12.00	$ 48.00	$6.50		5	$12.14

Table No. 8

Reconnaissance Cost, Northeast Washington, 1927

Subsistence	Equipment	Transportation of men	Salaries	Total	Acres Worked	Cost per Acre
$226.58	$32.51	$132.47	$566.70	$958.26	293,127	$.003

This crew boarded at various ranch houses and at times had their own camps. Due to the nature of the work and lack of reliable advance information, much time was necessarily spent in travel. A considerable portion of the area was burned which accounts for the low cost per acre.

V. Collection of Data

This has been fully explained in the Annual Report for reconnaissance in Idaho.

Table No. 8

Personnel Days, Overhead Facilities, 1937

Fiscal-Year	Equip-ment	Procedure-Clerk	Salaries Total	Acres Burned	Cost per Acre
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

BLISTER RUST INFECTION CONDITIONS IN WESTERN WASHINGTON IN 1927

By

H. M. Putnam
Associate Pathologist

I. Purpose of Work

The purpose of scouting for blister rust in western Washington was three-fold. In the first place, it was desired to know the extent of the disease in its spread towards the white and sugar pine areas of Oregon. It was already known to exist on Ribes in two counties of northwestern Oregon, and in practically all of the counties of Washington west of the summit of the Cascades. Scouting in 1927 had for its primary purpose the search for pine infection centers in western Washington, especially on the mountainous portions not covered in previous scouting.

Secondly, it was desired to find areas offering suitable conditions for future study of the disease from the standpoint of its control.

The third purpose was to locate all areas where white pine existed on the coast. This was important not only on account of the intrinsic value of the pine, but also from the standpoint of such pine stands becoming relay points to take the rust and form new centers of infection and thus aid it in its advance toward the white and sugar pine stands of Oregon and California.

II. Location of Work

The region to be scouted included both slopes of the Cascades for their length in Washington; the Olympic Peninsula; and all areas between.

III. Known Infection Conditions Previous to 1927

A. Ribes Infection

The rust was first found in western Washington on Ribes nigrum in November, 1921, at a few points in the Puget Sound Region. Scouting in 1922 in conjunction with the black currant campaign, and a limited amount of scouting, 1923 to 1926 inclusive, established the fact that the rust on Ribes had been found in every county of Washington west of the summit of the Cascades, with the exception of Skamania County.

I. Purpose of Work

The purpose of the ruling for Blister rust in western White pine was three-fold. In the first place, it was desired to know the extent of the disease in the eye-seat towards the White and sugar pine areas of Oregon. It was already known to exist on Ribes in two counties of northwestern Oregon, and in practically all of the counties of Washington west of the summit of the Cascades. Scouting in 1927 had for its primary purpose the search for pine infection centers in western Washington, especially on the mountainous portions not covered in previous scouting.

Secondly, it was desired to find areas offering suitable conditions for future study of the disease from the standpoint of its control.

The third purpose was to locate all areas where white pine existed on the coast. This was important not only on account of the intrinsic value of the pine, but also from the standpoint of such pine stands becoming relay points to take the rust and form new centers of infection and thus aid it in its advance toward the white and sugar pine stands of Oregon and California.

II. Location of Work

The region to be scouted included both slopes of the Cascades for their length in Washington; the Olympic Peninsula; and all areas between.

III. Areas Scouting Results Proving as Follows

A. White Pine Areas.

The rust was first found in western Washington on Ribes <u>mi</u>rrum in November, 1921, at a few points in the Puget Sound Region. Scouting in 1922 in conjunction with the Black currant campaign, and a limited amount of scouting, 1923 to 1926 inclusive, established the fact that the rust on Ribes had been found in every county of Washington west of the summit of the Cascades, with the exception of [illegible] County.

B. Pine Infection

Pine infection in western Washington was first found in November, 1921, on two planted Pinus monticola in the Mt. Vernon Nursery, Mt. Vernon. These pines were from the D. Hill Nursery at Dundee, Illinois. At the end of the 1926 field season, 14 pine infection locations had been found in five counties as follows: Clallam County, 4 locations; Jefferson County, 5 locations; Kitsap County, 2 locations; Skagit County, 1 location; and Whatcom County, 2 locations.

II. Organization of Work

A. Preliminary Collection of Data

Before going into the field all possible information was collected from records relative to previous locations of infection and locations of pine stands. Such information was obtained from the following sources:

1. Records of black currant infections in connection with the black currant campaign in 1923.
2. All scouting records.
3. Pine location records of this office.
4. Records and maps from the Forest Service showing locations of pines, native and planted.

B. Conferences with Forest Service Officials

Before actual scouting work was performed on any national forest, the Forest Supervisor's office was visited. The object and nature of the work was explained and all possible information was obtained relative to the locations of pine areas and their accessibility, as well as the locations of ranger stations, camps, etc., on the forest.

The following national forest offices were interviewed:

1. Columbia National Forest
2. Mount Baker National Forest
3. Olympic National Forest
4. Rainier National Forest
5. Snoqualmie National Forest
6. Wenatchee National Forest

In every instance excellent cooperation was obtained. The forest supervisors without exception were most cordial and willing to help out in every way possible. In several instances letters

Pine infection in western Washington was first found in November, 1931, on two planted Pinus monticola in the Mt. Vernon Nursery, Mt. Vernon. These plants were from the E. Hill Nursery at Dundee, Illinois. At the end of the 1932 field season, 14 pine infection locations had been found in five counties as follows: Clallam County, 4 locations; Jefferson County, 5 locations; Kitsap County, 2 locations; Skagit County, 1 location; and Whatcom County, 2 locations:

II. Organization of Work

A. Preliminary Activities of Jobs

Before going into the field all possible information was collected from records relative to previous locations of infection and locations of pine plants. Such information was obtained from the following sources:

1. Reports of blister rust infections in connection with the white current campaign in 1932.

2. All scouting records.

3. Pine location records of this office.

4. Records and maps from the Forest Service showing locations of plants, native and planted.

B. Correspondence with Forest Officials

Before actual scouting work was performed on any national forest, the Forest Supervisor's office was visited. The object and nature of the work was explained and all possible information was obtained relative to the locations of pine areas and their accessibility, as well as the locations of Ranger Stations, camps, etc., on the forest.

The following national forest offices were interviewed:

1. Olympic National Forest
2. Mount Baker National Forest
3. Olympic National Forest
4. Snoqualmie National Forest
5. Wenatchee National Forest
6. Okanogan National Forest

In every instance excellent cooperation and assistance was rendered by the Forest Supervisors and ranger officials. The Forest Supervisors without exception were most cordial and willing to help out in every way possible. In several instances letters

were sent out from the Supervisor's office to the district rangers and protection forces explaining our work and asking them to help us out in any way possible.

A letter of introduction for each of the scouts was obtained from each of the supervisors' offices.

C. Instructions for Scouting

The following is an excerpt from the set of instructions issued to each man:

"General Principles of Scouting. Plan the work so that the entire area assigned to you will be equally covered. Do not concentrate scouting in one portion to the neglect of other portions.

"Scout drainages leading from the mountains. Go as far as possible by car then scout on foot. Remember that much of this area has been covered along roads, but practically none of it away from roads.

"In scouting look for associations of Ribes and white pines. Inspect Ribes for infection. If they are infected, inspect all white pines carefully. It may be possible to find pine infection by finding out the direction of intensification of rust on Ribes. When pine infection is found, try to find the center of infection and its extent.

"Ribes may be given the following order of susceptibility beginning with the most susceptible:

1. R. nigrum
2. R. bracteosum
3. R. sanguineum
4. R. acerifolium
5. G. divaricata
6. G. lobbii
7. R. lacustre

"Recording Results. All scouting performed will be reported on the scouting report forms. Each inspection point will be located as accurately as possible on a number in that county. All roads and trails scouted will be traced on the map.

"Precautions. Scouting is of value only if it is conscientiously and intelligently done. Each scout must learn to strike a happy medium between the extreme of minute attention to a small area and that of covering a large area too hurriedly.

were sent out from the Supervisor's office to the district rangers and protection forces explaining our work and asking them to help us out in any way possible.

A letter of introduction for each of the scouts was obtained from each of the supervisors' offices.

5. Instructions for scouting

The following is an excerpt from the set of instructions issued to each man:

"General Principles of Scouting. Plan the work so that the entire area assigned to you will be equally covered. Do not concentrate scouting in one portion to the neglect of other portions.

"Scout ridges leading from the mountains. Go as far as possible by car then scout on foot. Remember that much of this area has been covered along roads, but practically none of it away from roads.

"In scouting look for associations of Ribes and white pines. Inspect Ribes for infection. If they are infected, inspect all white pines carefully. It may be possible to find pine infection by finding out the direction of intensification of rust on Ribes. When pine infection is found, try to find the center of infection and its extent.

"Ribes may be given the following order of susceptibility beginning with the most susceptible:

1. R. alpe
2. R. bracteosum
3. R. sanguineum
4. R. acerifolium
5. R. divaricata
6. R. Lacustre
7. R. leptanthe

"Recording Results. All scouting performed will be reported on the scouting report forms. Each inspection point will be located as accurately as possible on a number in that county. All roads and trails scouted will be traced on the map.

"Precautions. Scouting is of value only if it is conscientiously and intelligently done. Each scout must learn to strike a happy medium between the extreme of minute attention to a small area and that of covering a large area too hurriedly.

"It is undisputable that the rust is much more widely spread than the findings of scouts would indicate. In other words, if you do not find the rust, it does not mean it is not there. If you do find it, it is a safe assumption that it is much more widely prevalent that you believe it to be.

"Always disinfect your clothes with ammonia when leaving an infected area. Cases have been known in the east where scouts have actually spread the disease by going from an infected Ribes to a healthy one, and carrying spores."

D. Scouting Report Forms Used

The form shown following is that used in recording results of scouting. It may be noted that the front side is devoted to pine inspection and the other side to inspection of Ribes. Space is given for the recording of the average distance from Ribes to healthy pines and infected pines. These figures are necessarily very general but do serve to indicate the degree of association of pines and Ribes.

The sketch map is of value both from the standpoint of specific location of the inspection point, and also to show the relationship between hosts, either healthy or infected.

Year of Growth Infected	Last Symptoms	Juvenile	Last Pycnia	First Time	Twice
1926					
1925					
1924					
1923					
1922					
1921					
1920					
1919					
1918					
1917					
1916					

"It is undisputable that the rust is much more widely spread than the findings of scouts would indicate. In other words, if you do not find the rust, it does not mean it is not there. If you do find it, it is a safe assumption that it is much more widely prevalent that you believe it to be.

"Always disinfect your clothes with ammonia when leaving an infected area. Cases have been known in the east where scouts have actually spread the disease by going from an infected Ribes to a healthy one, and carrying spores."

b. Scouting Report Forms Used

The form shown following is that used in recording results of scouting. It may be noted that the front side is devoted to plane inspection and the other side to inspection of Ribes. Space is given for the recording of the average distance from Ribes to healthy plants and infected plants. These figures are necessarily very general but do serve to indicate the degree of association of plants and Ribes.

The sketch map is of value both from the standpoint of specific location of the inspection point, and also to show the relationship between hosts, either healthy or infected.

WF-BRC-38-7/15/27

Scouting for Blister Rust

Owner_____ State_____ Co_____ No_____

Location: T._____ R._____ Sec._____

Inspector_____ Date_____

White Pine Species

Occurrence (Scattered, abundant, etc.)	Age Class	Height	Condition	Number Examined	Number Infected

Individual Pine Infection

Pine No.	Age	Height	Crown Class	Number Cankers		Remarks: Trunk killed, number of branches killed, secondary infection, etc.
				Trunk	Branch	

Age of Infection

Year of Growth Infected	Number of Cankers							
	1st Symptoms	Juvenile	1st Pycnia	Pycnial Scars	Produced Aecia			
					First Time	Twice	Several Times	Dead
1926								
1925								
1924								
1923								
1922								
1921								
1920								
1919								
1918								
1917								
1916								

Ribes Inspection

Ribes Species	Number Examined	Number Infected	Ave. % Leaves Infected	% Infected Surface Bearing: Uredinia	% Infected Surface Bearing: Telia	% Infected Surface Bearing: Necrotic Areas	Average distance to Pines: Healthy	Average distance to Pines: Infected

N.



Sketch Map

O = White pine not infected.
Θ = White pine infected alive.
⊕ = White pine infected dead.
x = Ribes species followed by initial of Ribes species.

Scale 1 inch = Feet.

Remarks:

E. Personnel and Allotment of Areas

1. Scouting, spring, 1927. From March 30 to April 4, a short scouting trip was made by Goodding and Putnam by automobile., Points in the Olympic Peninsula and northern Puget Sound region were scouted. The results are shown further on in this report.

2. Scouting, summer, 1927. The scouting organization consisted of the field supervisor with his automobile, and 3 field parties, each composed of 2 men and an automobile. Later another man was added to the force to travel with the field supervisor.

The entire Cascade Range and coast region was divided into three parts and each part allotted to one scouting crew. The division was a as follows:

a. Olympic Peninsula south. This region includes all of the Olympic Peninsula west of Puget Sound, and southwestern Washington lying west of the Pacific Highway from Olympia to Portland.

The following counties, in whole or part, lie in this area: Clallam, Jefferson, Kitsap, Mason, Grays Harbor, Pacific, Wahkiakum, and the west portions of Thurston, Lewis and Cowlitz counties.

b. Northern Cascades. This region includes the timbered area on both sides of the Cascades in Washington north of the northern boundary of Kittitas County and the divide between the Snoqualmie and Stilaguamish rivers.

The following counties in whole or in part, lie in this area: Whatcom, Skagit, Island, Snohomish counties, western portions of Okanogan and Chelan counties, and the northern portion of King County.

c. Southern Cascades. This region includes the timbered area on both sides of the Cascades from the northern boundary of Kittitas County and the divide between the Snoqualmie and Stilaguamish rivers, south to the Columbia River, and west to the Pacific Highway.

The following counties, in whole or in part, lie in this area: Skamania, Clarke, Pierce counties; the eastern portions of Thurston, Lewis and Cowlitz counties; the southern portion of King County; and the western portions of Kittitas, Yakima and Klickitat counties.

F. Training of Personnel

During the latter part of July, the men were given a few days

4. Personnel and allotment of area

1. Scouting, spring, 1927. From March 30 to April 4, a short scouting trip was made by Goodding and Putnam by automobile. Points in the Olympic Peninsula and northern Puget Sound region were scouted. The results are shown further on in this report.

2. Scouting, summer, 1927. The scouting organization consisted of the field supervisor with his automobile, and 3 field parties, each composed of 2 men and an automobile. Later another man was added to the force to travel with the field supervisor.

The entire Cascade Range and coast region was divided into three parts and each part allotted to one scouting crew. The division was as follows:

a. Olympic Peninsula south. This region includes all of the Olympic Peninsula west of Puget Sound, and southwestern Washington lying west of the Pacific Highway from Olympia to Portland.

The following counties, in whole or part, lie in this area: Clallam, Jefferson, Kitsap, Mason, Grays Harbor, Pacific, Wahkiakum, and the west portions of Thurston, Lewis and Cowlitz counties.

b. Northern Cascades. This region includes the timbered area on both sides of the Cascades in Washington north of the northern boundary of Kittitas County and the divide between the Snoqualmie and Stillaguamish rivers.

The following counties in whole or in part, lie in this area: Whatcom, Skagit, Island, Snohomish counties, western portions of Chelan and Okanogan counties, and the northern portion of King County.

c. Southern Cascades. This region includes the timbered area on both sides of the Cascades from the northern boundary of Kittitas County and the divide between the Snoqualmie and Stillaguamish rivers, south to the Columbia River, and west to the Pacific Highway.

The following counties, in whole or in part, lie in this area: Skamania, Clarke, Pierce counties; the eastern portions of Thurston, Lewis and Cowlitz counties; the southern portion of King County; and the western portions of Kittitas, Yakima and Klickitat counties.

5. Training of personnel

During the latter part of July, the men were given a few days

intensive training in the vicinity of Bremerton, where several pine infection centers had previously been found. In the training period the following points were stressed:

1. Life history of blister rust
   a. How it spreads
      (1) Long distances, pines to Ribes
      (2) Short distances, Ribes to Ribes
      (3) Short distances, Ribes to Pines

2. Pine infection
   a. Normal development of canker
   b. Recognition of all stages of infection
   c. Determination of year of growth infected

3. Ribes infection
   a. Identification of Ribes species native to the region
   b. Recognition of uredinial and telial stages on Ribes leaves

4. Scouting methods
   a. What constitutes a good inspection point.
   b. How to scout pines
   c. How to scout Ribes

5. Recording results
   a. Recording pine inspection
   b. Recording Ribes inspection
   c. Making sketch map
   d. What to put in notes

V. Results of Scouting

A. Spring Scouting

Table No. 1 shows a summary of the results of the spring scouting trip:

scouting trip:

Table No. 1 shows a summary of the results of the spring

A. Spring Scouting

V. Results of Scouting

d. What to put in notes
c. Making sketch map
b. Recording Ribes inspection
a. Recording pine inspection

5. Recording results

c. How to scout Ribes
b. How to scout pines
a. What constitutes a good inspection point,

4. Scouting methods

leaves
b. Recognition of vrednimal and teital stages on Ribes
a. Identification of Ribes species native to the region

3. Ribes infection

c. Determination of year of growth infected
b. Recognition of all stages of infection
a. Normal development of canker

2. Pine infection

(3) Short distances, Ribes to Pines
(2) Short distances, Ribes to Ribes
(1) Long distances, pines to Ribes

a. How it spreads

1. Life history of blister rust

the following points were stressed:

infection centers had previously been found. In the training period
intensive training in the vicinity of Bremerton, where several pine

TABLE NO. 1

Summary of Results of Scouting for Pine Infection Performed by L. N. Goodding and H. N. Putnam March 30 to April 4, 1927

County	Total Pine Inspection Locations	Infected Pine Locations	% Pine Locations Infected	Number of Pines Examined	Number of Pines Infected	% Pines Infected
Clallam	10	5	50%	149	24	15%
Jefferson	8	4	50%	170	17	10%
Kitsap	6	3	50%	420	126	30%
Mason	2	1	50%	61	4	7%
Skagit	2	0	0	5	0	0
Snohomish	4	0	0	38	0	0
Whatcom	13	5	38%	398	27	7%
Total	45	18	40%	1,241	197	16%

Infection on pines was found well distributed on the Olympic Peninsula. In no case was a good association of R. bracteosum and white pines found without resultant pine infection. In several instances pines were found infected associated with Ribes species other than R. bracteosum.

Infection in Whatcom County between Sumas and Maple Falls, was unusual in that although 10% of the pines were infected, associated Ribes were very scarce.

No data on Ribes infection was possible that early in the season. The occurrence of different Ribes species at each inspection point was noted.

B. Summer Scouting by Counties

Owing to the fact that scouting on the coast was stopped in early September one month sooner than was expected, the entire region as outlined, was not scouted. Scouting was performed by the supervisor and one crew August 1 to September 7 inclusive; by one crew August 1 to September 8; and by a one-man crew August 1 to September 15.

TABLE NO. 1

Summary of Results of Scouting for Pine Infection Performed
by L. M. Gaucher and E. W. Purdue
From May 20 to April 1, 1927

County	Total Pine Inspection Localities	Infected Pine Localities	Trees Examined	Ratio of Pines Infected: Examined	Per Cent Infected
Placer	10	5	301	1:15	33
Nevada	3	1	57	1:57	17
Yuba	5	2	50	1:25	4
Sierra	5	1	31	1:31	3
Butte	5	1	301	1:301	0.3
Glenn	2	0	0	0	0
Lake	4	0	0	0	0
Mendocino	12	2	345	1:172	1
Total	45	12	1,341	1:112	10

Infection on pines was found well distributed on the Olympic peninsula. In no case was a good percentage of B. ribicola and white pines found without resultant pine infection. In several instances pines were found infected associated with Ribes species other than R. erectum.

Infection in Nevada County, between Summa and Maple Falls, was unusual in that although 10% of the pines were infected, associated Ribes were very scarce.

No data on Ribes infection was possible that early in the season. The occurrence of different Ribes species at each inspection point was noted.

B. Labor Scouting by Counties

Owing to the fact that scouting on the coast was stopped in early September one month sooner than was expected, the entire region as outlined, was not scouted. Scouting was performed by the supervisor and one crew August 1 to September 7 inclusive; by one crew August 1 to September 8; and by a one-man crew August 1 to September 15.

The following list of counties show the status of work at the close of scouting:

(a) Counties in which scouting was completed: Clallam, Jefferson, King, Mason, Pierce, Skagit, Skamania, snohomish, Whatcom, and Kitsap counties.

(b) Counties approximately half scouted; Cowlitz, Grays Harbor, and Lewis counties.

(c) Counties not scouted at all, or much less than half: Chelan, Island, Kittitas, Klickitat, Pacific, Thurston, Wahiakum, Yakima, and Clarke counties.

It must be understood that scouting in those counties listed as completed was necessarily performed only in a very general way. Owing to the large region to be scouted it was possible only to devote a very limited amount of time to each county. Scouting was performed principally by aid of autos. However, on several occasions in inaccessible portions, scouting was done on foot and on horseback.

The results of scouting are given below, detailed by counties. Scouting performed in each county was put up in final form showing routes scouted in red, and the inspection points numbered consecutively in each county and indicated on the map by number according to the following legend:

Scouting, 1927

□ Pines only present, not infected
▲ Pines only infected
X Ribes only present, not infected
O Ribes only present, infected
Ⓐ Pines and Ribes infected
△ Good association, neither infected
Ⓐ Good association, Ribes only infected

In the analysis of scouting given below by counties, the basis on which reports were classified is association of host plants as follows: (1) Healthy pines, no Ribes; (2) infected pines, no Ribes; (3) healthy pines with healthy Ribes; (4) infected pines with healthy Ribes; (5) healthy pines with infected Ribes; (6) infected pines with infected Ribes; (7) No pines, healthy Ribes, and (8) no pines, infected Ribes.

The following list of counties show the status of work at the close of scouting:

(a) Counties in which scouting was completed: Clallam, Jefferson, King, Mason, Pierce, Skagit, Snohomish, Whatcom, and Kitsap counties.

(b) Counties approximately half scouted: Cowlitz, Grays Harbor, and Lewis counties.

(c) Counties not scouted at all, or much less than half: Chelan, Island, Klickitat, Pacific, Thurston, Wahkiakum, Yakima, and Clarke counties.

It must be understood that counties listed as completed was necessarily performed only in a very general way. Owing to the large region to be scouted it was possible only to devote a very limited amount of time to each county. Scouting was performed principally by aid of autos. However, on several occasions it was necessary parties, scouting was done on foot and on horseback.

The results of scouting are given below, detailed by counties scouting performed in each county was put up in final form showing routes scouted in red, and the inspection points numbered consecutively in each county and indicated on the map by number according to the following legend:

Scouting, 1922

- ☐ Pines only present, not infected
- ▲ Pines only infected
- X Ribes only present, not infected
- ○ Ribes only present, infected
- ⊘ Pines and Ribes infected
- △ Good association, neither infected
- ⊘ Good association, Ribes only infected

In the analysis of scouting given below by counties, the basis on which reports were classified in association of host plants as follows: (1) Healthy pines, no Ribes; (2) infected pines, no Ribes; (3) healthy pines with healthy Ribes; (4) infected pines with healthy Ribes; (5) healthy pines with infected Ribes; (6) infected pines with infected Ribes; (7) No pines, healthy Ribes, and (8) no pines, infected Ribes.

Distances from Ribes to pines where the two hosts were associated, were divided into 5 classifications as follows: (1) 100 feet or less; (2) 101 feet to 300 feet; (3) 301 feet to 500 feet; (4) 501 feet to 1000 feet; and (5) over 1000 feet.

Certain terms descriptive of stages of introduction and establishment of the rust will be used in this report and should be described here.

(1) Stage of introduction: Characterized by the initial infection of Ribes often at long distances from the infected pines. From these infected Ribes nearby white pines become infected and thus new centers of pine infection are formed. No actual damage to white pine is apparent in this stage of spread, and usually the pine infections are so few that they are very difficult to find.

(2) Stage of intensification: After a few years the pine infection centers, established during the introductory stage, begin to produce aecia. At first, the volume of spores is insufficient to cause further long distance spread of the disease, but the Ribes in the surrounding locality become well infected and each season increase the amount of infection on the pines. This process results in the establishment of numerous local centers of severe pine infection.

(3) Damage stage: Conditions are now favorable for an epidemic of the disease in this locality. The annual infection of numerous Ribes causes very heavy pine infection. As time goes on and these pines begin to die, the results of this heavy local infection in damage to pine become more and more striking. The time is also ripe, due to the production of large numbers of aecia, for a new wave of long distance infection on Ribes, thus starting disease centers anew at other points in localities heretofore free from the rust.

1. Chelan County. Chelan County was scouted chiefly incident to travel across the state. No infection, either on Ribes or pines, was found.

a. Record of scouting performed. The following tabulation shows the results of scouting classified according to association of hosts:

Distances from Ribes to pines where the two hosts were associated, were divided into 5 classifications as follows: (1) 100 feet or less; (2) 101 feet to 500 feet; (3) 501 feet to 800 feet; (4) 801 feet to 1000 feet; and (5) over 1000 feet.

Certain terms descriptive of stages of introduction and establishment of the rust will be used in this report and should be described here.

(1) Stage of introduction: Characterized by the initial infection of Ribes often at long distances from the infected pines. From these infected Ribes nearby white pines become infected and thus new centers of pine infection are formed. No actual damage to white pine is apparent in this stage of spread, and usually the pine infections are so few that they are very difficult to find.

(2) Stage of intensification: After a few years the pine infection centers, established during the introductory stage, begin to produce aecia. At first, the volume of spores is insufficient to cause further long distance spread of the disease, but the Ribes in the surrounding locality become well infected and each season increase the amount of infection on the pines. This process results in the establishment of numerous local centers of severe pine infection.

(3) Damage stage: Conditions are now favorable for an epidemic of the disease in this locality. The annual infection of numerous Ribes causes very heavy pine infection. As time goes on and these pines begin to die, the results of this heavy local infection in damage to pine become more and more striking. The time is also ripe, due to the production of large numbers of aecia, for a new wave of long distance infection on Ribes, thus starting disease centers anew at other points in localities heretofore free from the rust.

1. Chelan County. Chelan County was accepted chiefly incident to travel across the state. No infection, either on Ribes or pines, was found.

2. Record of scouting performed. The following tabulation shows the results of scouting classified according to association of hosts:

TABLE NO. 2

Analysis of Scouting

Chelan County

Association of Hosts	No. Of Inspection Points	Pine Inspection			Ribes Inspection				Distance From Ribes to:	
		Examined	Infected	Cankers Per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected Per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	2	38	0	--	--	--	--	--	?	?
Healthy Pines with Healthy Ribes	1	2	0	--	R. bract.	8	0	--	100 ft. or less	?
	1	82	0	--	R. lac.	6	0	--	500 ft. to 1000 ft.	?
	2	None Examined			R. bract.	35	0	--	1,320 ft.	?
Totals	6	122	0	--	R. bract. R. lac.	43 6	0 0			

TABLE NO. 3

Analysis of Scoring

Chelsea County

Association of Ideas	No. of Inspection Points	Line Description										Miles Inspected				Distance from Cities to;		
		Semi-Tangent	Tangent	Inter-locking Trees	Centers Left Inspector	Bushes		Mr. Brook.		Mr. Lane.		Mr. Brook.		Leaves Undisturbed		Leaves Disturbed		
								Semi-Tangent	Tangent	Semi-Tangent	Tangent	Semi-Tangent	Tangent	Semi-Tangent	Tangent	Semi-Tangent	Tangent	
Close Locality	8	4	1	0	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Nearby Cities																		
Nearby Cities																		
Nearby Cities																	

2. Clallam County

a. Record of scouting performed. Table No. 3 shows the results of scouting in Clallam County, classified by association of boats.

Association of Boats	Number of Scouting Trips	Miles Traversed: Channel	Inland	Fiord	Miles Traversed: Number of Days	Miles Traversed: Number of Trips	Miles Traversed: Average Distance Traversed per Trip	Distance From Nest to: Nearest Healthy Nest	Distance From Nest to: Nearest Infected Nest
Nests Healthy At Start	8	87	7	—	—	—	—	1	1
Nests Infected At Start	4	83	8	—	Possibility of H. bracteatum and Fir Trees across river not investigated				
Nests Healthy	3	58	6	—	4	6	—	1/2 Mi.	1
Nests Healthy	3	170	11	—	8	11	—	1/2 Mi.	1
Nests Inf. with Nests Healthy	1	9	2	3	1	2	—	1/2 Mi.	1/2 Mi.
Nests Healthy	1	1	—	—	1	1	1	1/2 Mi.	1
Nest Nests Infected	1	1	—	—	1	1	1	1/2 Mi.	1
Nests Infected	1	8	1	—	1	1	1	1/2 Mi.	1
Nest Nests Infected	3	87	24	4	4	5	1	1/2 Mi.	1/2 Mi.
Nests Infected	2	3	3	1	1	1	1	1/2 Mi.	1/2 Mi.
	—	—	1	—

TABLE NO. 3

Analysis of Scouting

Clallam County

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers Per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected Per Infected Bush	Distance From Ribes to: Healthy Pines	Distance From Ribes to: Infected Pines
Pines Healthy No Ribes	6	87	0	--	none	--	--	--	?	?
Pines Infected No Ribes	1	30	2	1	none Possibility of R. bracteosum 900 Feet from pines across river not inspected					
Pines Healthy with Ribes Healthy	5	55	0	--	R. brac. R. sang. G. lobb.	8 8 19	0 0 0	-- -- --	100 ft. or less	?
	5	35	0	--	R. brac. R. sang. R. lac.	15 8 20	0 0 0	-- -- --	101 ft. to 300 ft.	?
Pines Inf. with Ribes Healthy	1	1	1	3	R. brac.	5	0	--	?	150 ft.
	1	7	3	1-1/3	R. brac.	5	0	--	75	100 ft.
Pines Healthy with Ribes Infected	1	1	0	--	R. brac.	10	4	1%	100	?
	1	1	0	--	R. sang. G. div. G. lobb.	6 1 15	1 0 1	1% -- 2 lvs	4-50ft. 300 ft. 25-300ft	? ? ?
Pines Infected with Ribes Infected	1	5	5	100	R. nig. R. vulg.	12 17	12 2	99% 1 leaf	? ?	100 ft. 100 ft.
	(1) P.m.	69	34	4	R. brac.	1	1	5%	250 ft.	250 ft.
	P.s.	9	3	1	R. lax.	1	0	--	75 ft.	75 ft.
	1	3	1	1	R. sang.	1	1	2%	25 ft.	1 ft.
	1	11	10	7-1/3	R. brac.	1	1	100%	150 ft.	75 ft.
	1	78	4	1	R. brac.	35	5	4%	50-400	50-400
	1	13	1	1	R. brac.	7	2	3 lvs.	600	600
No Pines Ribes Healthy	28	--	--	--	R. brac. R. sang. R. lac. G. div.	674 3 6 3	0 0 0 0	-- -- -- --	? ? ? ?	? ? ? ?
No Pines Ribes Infected	10	--	--	--	R. brac. R. sang. R. lac.	148 1 7	37 0 0	6% -- --	? ? ?	? ? ?

Table No. 3, Continued

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to:	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected Per Infected Bush	Healthy Pines	Infected Pines
Totals	65				R.nig.	12	12	99 %		
	P.mont	396	61	12	R.brac.	909	50	7 %		
	P.stro.	9	3	1	R.lax.	1	0	--		
					R.sang.	37	3	1½ %		
					R.lac.	33	0	--		
					R.vulg.	17	2	1 leaf		
					G.div.	4	0	--		
					G.lobb.	34	1	2 "		
Grand Total						1047	67	24½ %		

(1)There were 7 inspection points where pines only were found and examined. At one of these points infected pines were found, but no Ribes. This indicates that associated Ribes were scarce and that infection presumably came from some distance away.

(2)There were 20 inspections made where pines and Ribes were both present. At 10 of these points, or 50%, either one or both hosts were found infected; 2 of them, or 10%, showed pines infected with Ribes healthy 2 of them or 10% showed pines healthy with infected Ribes; while 6 or 30% of the points showed both hosts infected. These figures indicate (a) that infection on pines, or infection on Ribes associated with pines is well distributed, and (b) that at 30% of the points, infection conditions are in early stages of intensification.

(3)There were 38 inspection points where Ribes only were found. Ten of these points, or approximately 26%, showed infected Ribes. This would indicate that an aecial source existed sufficiently large to distribute spores to Ribes and extend the limits of the rust.

(4) The average per cent of Ribes bushes infected and average per cent of leaves infected per infected bush for different associations of hosts can best be shown in a small table derived from Table No. 3.

Table No. 6, Continued

Associa-tion of Spots	No. of Inspec-tion Points	Pine Inspection			Ribes Inspection				Distance from Ribes to:	
		Exam-ined	Infec-ted Tree	Exam-ined for Infec-ted Bark	Species	Exam-ined	No. Infec-ted	% Leaves Infec-ted	Healthy Pines	Infected Pines
Totals	55				M. nig.	18	13	72		
	Amount	49	12	61	R. pro.	30	24	79		
	Percentage	9	1	8	R. lac.	1	0	--		
					R. cer.	27	8	1/4		
					R. ino.	23	0	--		
					R. vul.	17	8	1/4		
					C. div.	4	0	--		
					C. lob.	16	1	1/4		
Grand Total						126	54	42		

(1)There were 7 inspection points where pines only were found and examined. At one of these points infected pines were found, but no Ribes. This indicates that associated Ribes were scarce and that infection probably came from some distance away.

(2)There were 20 inspections made where pines and Ribes were both present. At 10 of these points, or 50%, either one or both hosts were found infected; 3 of them, or 10%, showed pines infected with Ribes healthy 2 of them or 10% showed pines healthy with infected Ribes; while 5 or 50% of the points showed both hosts infected. These figures indicate (a) that infection on pines, or infection on Ribes associated with pines is well distributed, and (b) that at 50% of the points, infection conditions are in early stages of intensification.

(3)There were 28 inspection points where Ribes only were found. Ten of these points, or approximately 36%, showed infected Ribes. This would indicate that an aecial source existed sufficiently large to distribute spores to Ribes and extend the limits of the rust.

(4) The average per cent of Ribes bushes infected and average per cent of leaves infected per infected bush for different associations of hosts can best be shown in a small table derived from Table No. 6.

Table No. 4

Per Cent of Ribes Infected in Different Associations of Hosts, Clallam County

Association of Hosts	Inspection Points	Ribes Infection per Cent: Species	No. Exam.	No. Inf.	% Bushes Infected	% Leaves Inf. per Inf. Bush
Pines healthy with Ribes Infected		R.bract.	10	4	40%	1%
		R.sang.	6	1	17%	1%
		G.div.	1	0	0	0
		G.lobbii	15	1	7%	2 leaves
	2	Total	32	6	19%	4%
Pines Infected with Ribes Infected		R.nigrum	12	12	100%	99%
		R.bract.	44	9	20%	16%
		R.lax.	1	0	0	0
		R.sang.	1	1	100%	2%
		R.vulg.	17	2	12%	1 leaf
	6	Total	75	34	45%	39%
No Pines Ribes Infected		R.bract.	143	37	25%	6%
		R.sang.	1	0	0	0
		R.lac.	7	0	0	0
	10	Total	156	37	24%	6%

The significance of evidence presented in Table No. 4 is that infection on Ribes associated with infected pines is much greater than in either of the other two divisions. The reason for this increased infection is that a certain amount of intensification or additional infection of Ribes from nearby infected pines is evident, while in the other two instances, infection points would be classified as being in the introductory stage.

The same condition holds true if it is based on infection of individual species.

b. Details of certain pine infections. Information regarding pine infections more complete than that shown in Table No. 3 is desirable, since the amount of pine infection is the best criterion of the status of the disease. Certain pine infection points in the county are discussed separately.

Name: Beaver Infection. Inspection No. 11

Location: Pinus monticola planted in yard of T. F. Rixon, 1½ miles northeast of Beaver, Clallam County, T. 30N., R. 12 W., Sec. 30.

Inspector: Hornibrook and Hawley, August 6, 1927.

Pine Inspection: Examined 5; infected 5. One tree, 20 feet tall, showed 101 cankers, and only lower half of tree was inspected.

Table No. 4

Per Cent of Pines Infected in Different Associations
of Trees, Dallam County

Association of Pine Trees	Infection Points	Species	No. Exam.	No. Inf.	Pines Infection per Cent % Pines Infected	% Leaves Inf. per Inf. Pine
Pines Heavily with Pines Infected	2	R. brevi.	10	4	40%	1%
		R. vend.	8	1	12%	1%
		O. div.	1	0	0	0
		O. ful. fil.	15	1	7%	3 leaves
		Total	34	6	18%	4%
Pines Infected with Pines	6	S. micron.	13	12	100%	95%
		R. brevi.	44	9	20%	1%
		R. lax.	1	0	0	0
		R. vend.	1	1	100%	3%
		R. vulc.	17	2	12%	1 leaf
		Total	75	24	40%	12%
No Pines Infected	10	T. brevi.	145	37	26%	6%
		L. vend.	1	0	0	0
		L. lax.	2	0	0	0
		Total	165	37	22%	5%

The significance of evidence presented in Table No. 4 is that infection on Pines associated with infected pines is much greater than in either of the other two divisions. The reason for this increased infection is that a certain amount of intensification or additional infection of pines from nearby infected pines is evident, while in the other two instances, infection points would be classified as being in the introductory stage.

The same condition holds true if it is based on infection of individual species.

b. Details of certain pine infection. Information regarding pine infections more complete than that shown in Table No. 3 is desirable since the amount of pine infection is the best criterion of the status of the disease. Certain pine infection points in the county are discussed separately.

Name: Beaver Infection. Inspection No. 11
Location: Pinus monticola planted in yard of T. N. Nixon, 1½ miles northeast of Beaver, Dallam County, T. 3SN., R. 12 W., Sec. 30.
Inspector: Hornbrook and Hawley, August 8, 1927.
Pine Inspection: Examined 5; infected 5. One tree, 30 feet tall, showed 101 cankers, and only lower half of tree was inspected.

Canker analysis:

Table No. 5

Analysis of Cankers, Beaver Infection
Clallam County

Year of Growth Infected	Number of Cankers					
	First Pycnia	Pycnia Scars	Produced Aecia			Canker Dead
			First Time	Twice	Several Times	
1924		5	10	2		
1923	1	2	23	15	3	1
1922		7	37	19	1	2
1921			7	9	1	1
1920		1	4			1

Apparently 1923 and 1924 were good years for infection of pines from nearby Ribes.

Ribes inspection:

Table No. 6

Ribes Inspection, Beaver Infection,
Clallam County

Ribes Species	Number		% Leaves Infected per Inf. Bush	% Infected Sur-face Bearing		Average Distance Ribes to	
	Exam.	Inf.		Uredinia	Telia	Healthy Pines	Infected Pines
R. nigrum	12	12	99+	20%	80%	?	100 ft.
R. vulgare	17	8	1 leaf	30%	70%	?	100 ft.

Remarks: It was quite evident that R. nigrum was the Ribes responsible for the severe infection of the planted pines. No native white pines are known to occur anywhere in the vicinity. The nearest known pines are at least 15 miles distant. No material damage to the infected pines was evident this year. Nearly every branch showed one or more cankers.

Name: Pysht Infection, Inspection No. 32
Location: Merrill and Ring Lumber Company woods camp at Pysht, T. 31 N., R. 11 W., Sec. 16.
Inspectors: Hornibrook and Hawley, August 9, 1927.
Putnam and MacLeod, September 3, 1927.
Detwiler and Putnam, October 17, 1927.

Pine inspection:

Cedar Rapids:

Table No. 3

Analysis of Cankers, Borer Infection
Claiborne County

Year of Growth Infected	Number of Cankers Produced Jecia Type	Size	Pycnia Stage	Aecia Stage	Several Times	Canker Open
1921			10	3		
1922	1	3	85	12	3	1
1923		7	47	19	1	3
1924			7	9	1	1
1925		1	4			1

Apparently 1922 and 1924 were good years for infection of pines from nearby ribes.

Ribes ine section:

Table No. 4

Ribes Inspection, Beaver Infection,

Claiborne County

Ribes Species	Number Exam.	Inf.	Per Cent Infected Jan.	Bean	Prediction Berry	Health Plants	Average Distance Ribes to Infected plants
R. sicerum	12	12	934	30%	85%	1	100 ft.
R. vulgare	17	6	1 Leaf	80%	70%	1	100 ft.

Remarks: It was quite evident that R. sicerum was the Ribes responsible for the severe infection of the plantes pines. No native wild ribes are known to occur anywhere in the vicinity. The nearest known ribes are at least 15 miles distant. No material damage to the infected pines was evident this year. Nearly every branch showed one or more cankers.

Name: Pyatt Infection. Inspection No. 33

Location: Merrill and Pine Lumber Company woods camp at Pyatt.
T. 41 N., R. 11 W., Sec. 19.

Inspectors: Mortensen and Hanley. August 3, 1927.
Pathm and Hanley, September 3, 1927.
Detwiler and Pathm, October 17, 1927.

Pine infection:

Table No. 7

Inspection of Pines, Pysht
Clallam County

Date	Pinus Strobus			Pinus monticola		
	Examined	Infected	Canker per Inf. Tree	Examined	Infected	Canker per Inf. Tree
Aug. 9,1927				25	2	1½
Sept.3,1927	4	2	1	19	7	1½
Oct.17,1927	5	1	1	25	25	5
Totals	9	3	1	69	34	5

An interesting angle in connection with this inspection point was that at each subsequent inspection, pines were examined not found at previous inspections.

On August 9 pines planted in the grounds of the workers' houses were found. On September 3, additional pines planted in the yards of the officers' houses were inspected. On October 17, the original source of these pines, the rows where the seeds were planted 7 years by Mr. Merrill were located. Any one of these three locations, while in the same locality, is not readily visible from any other. This serves as an excellent illustration of the incompleteness of scouting. Owing to the large area assigned to each scouting crew, time did not permit a complete survey of the vicinity of any given infection point. Hence no criticism should be made of the scouts' actions in overlooking additional pines. The fault is chargeable to the force of circumstances necessitating a rapid scouting of the entire region.

An examination of Table No. 7 shows that 33% of the P. strobus found were infected with an average of one canker per infected tree, or 1/3 of a canker per tree; while 50% of the P. monticola trees were infected, with 4 cankers per infected tree, or 2 cankers per tree. It would appear, in this instance, that there were 6 times as many cankers produced on P. monticola as on P. strobus, both pine species being exposed to approximately the same source of Ribes infection.

In particular, the trees inspected on October 17 were subject to the same telial infection, since they were growing in two parallel rows 4 feet apart. In this instance, there was found 1/5 of a canker per P. strobus, and 5 cankers per P. monticola, or 25 times as many on P. monticola as on P. strobus.

Canker analysis: That infection on pines was extremely young is shown by the following table:

Table No. 7

Incidence of Pine Pest
Checking Survey

Date	Pines Examined	Pines Infested	Pines Infested by Type	Pinus Ponderosa Examined	Pinus Ponderosa Infested	Number per Inf. Tree
Aug. 3,1927				40	4	14
Sept. 2,1927	4	2	2	15	7	1
Oct. 17,1927	5	1	1	45	17	1
Totals	9	3	3	100	28	2

An interesting angle in connection with this inspection point was that at each subsequent inspection, pines were examined not found at previous inspections.

On August 3 pines planted in the grounds of the workers' houses were found. On September 3, additional pines planted in the yards of the officers' houses were inspected. On October 17, the original source of these pines, the rows where the seeds were planted 7 years by Mr. Morrill were located. Any one of these three locations, while in the same locality, is not readily visible from any other. This serves as an excellent illustration of the incompleteness of scouting. Owing to the large area assigned to each scouting crew, time did not permit a complete survey of the vicinity of any given infection point. Hence no criticism should be made of the scouts' sections in overlooking additional pines. The fault is chargeable to the force of circumstances necessitating a rapid scouting of the entire region.

An examination of Table No. 7 shows that 28% of the P. ponderosa found were infected with an average of one cankor per infected tree, or 1/3 of a canker per tree; while 50% of the P. monticola trees were infected, with 4 cankers per infected tree, or 2 cankers per tree. It would appear, in this instance, that there were 6 times as many cankers produced on P. monticola as on P. ponderosa, both pine species being exposed to approximately the same source of Pinus infection.

In particular, the trees inspected on October 17 were subject to the same initial infection, since they were growing in two parallel rows 4 feet apart. In this instance, there was found 1/5 of a canker per P. ponderosa, and 5 cankers per P. monticola, or 25 times as many on P. monticola as on P. ponderosa.

Canker analysis: Time interval on pines was ascertained by the following table:

Table No. 8

Analysis of Cankers, Pysht
Clallam County

Year of Growth Infected	Number of Cankers					
	First Symptoms	Juvenile	First Pycnia	Pycnial Scars	Produced Aecia 1 st Time	Twice
1925	1	5	4	1		
1924			2		1	
1923				1		1

It is evident from Table No. 8 that infection occurred chiefly in 1925 and 1926.

Ribes inspection: Only two Ribes were found in the vicinity, although it is extremely probable that a more extended examination of this area would show a greater number of Ribes. Table No. 9 shows the Ribes inspection made.

Table No. 9

Ribes Inspection, Pysht
Clallam County

Ribes Species	Number		% Leaves Infected per Infected Bush	Per Cent Infected Surface Bearing		Average Distance from Ribes to	
	Exam.	Inf.		Uredinia	Telia	Healthy Pines	Infected Pines
R.bract.	1	1	5%	20	80	250 ft.	250 ft.
R.lax.	1	?	Leaves gone			75 ft.	75 ft.

Remarks: This infection at Pysht is of importance from the standpoint of relative susceptibility of P. strobus and P. monticola. These trees were planted from seed in two rows 4 feet apart, in 1920, by Mr. Merrill. They were replanted from these rows to different points in the village. It is the intention to make a more thorough study of this situation in the future.

Name: Piedmont Plot. Inspection No. 62

Location: On East Fielding Creek, near Piedmont. T. 30 N., R. 9 W., Section 1.

Inspectors: Putnam and MacLeod, September 4, 1927.

Pine inspection: P. monticola 11 examined, 10 infected, 5 to 10 feet high, 7-1/2 cankers per infected tree.

Canker analysis:

Table No. 2

Analysis of Canker, Lyon
Clallam County

Year of Growth Infected	Number of Cankers				
	First Symptoms	Parental Cycle	First Pycnial Stage	Reduced Legion	
				1 at Time	Twice
1926	1	2	4		
1924			2	1	
1923			1		1

It is evident from Table No. 2 that infection occurred chiefly in 1926 and 1924.

Ribes inspection: Only two Ribes were found in the vicinity, although it is extremely probable that a more extended examination of this area would show a greater number of Ribes. Table No. 3 shows the Ribes inspection made.

Table No. 3

Ribes Inspection, Lyon
Clallam County

Ribes Species	Number	% Leaves Infected per Infected Bearing	Per Cent Infected Surface Bearing		Average Distance from Ribes to Nearest Infected	
	Exam.	Inf.		Ventrals	Galls	Pines	Pines
R. bract.	1	1	61	20	20	60 ft.	60 ft.
R. lac.	1	1	Leaves gone			75 ft.	70 ft.

Remarks: This infection at Lyon is of importance from the standpoint of relative susceptibility of P. ribicola and P. monticola. Three trees were planted from seed in two rows 4 feet apart, in 1920, by Mr. Merrill. They were replanted from these rows to different points in the village. It is the intention to make a more thorough study of this situation in the future.

Name: Piedmont Pilot. Inspection No. 62
Location: On East Fielding Creek, near Piedmont. T. 30 N., R. 9 W., Section 1.
Inspectors: Patten and Macleod, September 4, 1917.
Pine inspection: P. monticola 11 examined, 10 infected, 5 to 10 feet high, 7-1/2 cankers per infected tree.
Canker analysis:

Table No. 10

Canker Analysis, Piedmont Plot
Clallam County

Year of Growth Infected	Number of Cankers: First Symptoms	Juvenile	First Fycnia	Pycnial Scars	Produced Aecia: 1st Time	Twice
1925	3	14	1	6		
1924	2	3	2	27	2	
1923				5	1	6
1922	--			--	1	4

Infection probably occurred in 1925 and 1926.

Ribes inspection: R. bracteosum occurred in abundance along stream 75 to 300 feet from pines.

Table No. 11

Ribes Inspection, Piedmont Plot
Clallam County

Ribes Species	Number: Exam.	Inf.	% Leaves Infected per Infected Bush	% Infected Surface Bearing: Uredinia	Telia	Average Distance from Ribes to: Healthy Pines	Infected Pines
R. bract.	1	1	100%	1 49% necrotic	50	150	75

While information was taken on only 1 R. bracteosum, there were many showing similar infection conditions.

Remarks: This area was first found by Goodding and Patty in May, 1926. In March, 1927, this plot was again visited by Goodding and Putnam. This area constitutes an excellent situation in which to study damage to vigorous, open field, white pine from associated R. bracteosum.

3. Clarke County

a. Record of scouting performed. Table No. 12 shows the results of scouting in Clarke County, classified according to association of hosts.

Table No. 10

Center Analysis, Piedmont Flat
Clallam County

Year of growth infected	Number of Centers				
	First Symptoms	Previously Infected	First Year	Typical Cone	Produced Second Year Cone
1926	2	14	2	6	
1924	3	3	2	27	2
1923				5	1
1922					1

Infection probably occurred in 1923 and 1926.

Mines Inspection: K. praetecanum occurred in abundance along stream 75 to 300 feet from pines.

Table No. 11

Fiber Inspection, Piedmont Flat
Clallam County

Mines Species	Number Exam.	Inf.	% Leaves Infected Per Inf. Tree	% Infected Surface Bearing Undertufts	Twigs	Average Distance from Tufts to Nearest Infected Pines
K. praet.	1	1	100%	1 / 5% each particle	1	75

While information was taken on only 1 K. praetecanum, there were many showing similar infection conditions.

Remarks: This area was first found by Goodding and Petty in May, 1926. In March, 1927, this plot was again visited by Goodding and Putnam. This area constitutes an excellent situation in which to study damage to vigorous, open field, white pine from associated K. praetecanum.

3. Clarke County

a. Record of scouting performed. Table No. 12 shows the result of scouting in Clarke County, classified according to Emerson of Mesta.

Table No. 12

Analysis of Scouting, Clarke County, Wash.

Association of Hosts	No. of Inspection Point	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Healthy Pines. No Ribes	1	10	0	--	none	--	--	---	?	?
No Pines Healthy Ribes	4	0	0	--	R.bract	116	0	---	?	?
Totals	5	10	0	--	R.bract	116	0	---	?	?

No infection was found on either pines or Ribes.

4. Cowlitz County

a. Record of scouting performed. Table No. 13 shows the results of scouting in Cowlitz County, classified according to association of hosts.

Table No. 13

Analysis of Scouting, Cowlitz County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Healthy Pines. No.Ribes	1	4	0	--	none	--	--	--	?	?
Healthy Pines & Ribes	1	35	0	--	R.brac.	105	0	--	100 ft.	3 mi.
					R.lax.	5	0	--		
					R.lac.	7	0	--		
No Pines Healthy Ribes	19	--	0	--	R.brac.	546	0	--	?	?
					R.sang.	11	0	--		
					R.lax.	25	0	--		
					R.lac.	10	0	--		
					G.div.	5	0	--		
No Pines Ribes Infected	2	--	0	--	R.brac.	58	3	37%	?	?
	1	none			R.brac.	42	2	20%	1/8 mi.	4 mi.
Totals	24	39	0	--	R.brac.	751	5	30%		
					R.sang.	11	0	--		
					R.lax.	30	0	--		
					R.lac.	17	0	--		
					G.div.	5	0	--		
Grand Total						814	5			

Table No. 12

Analysis of Scouring, Clarke County, Iowa.

Association of Hosts	No. of Instances Noted	Pine Impregnation: Positive	Pine Impregnation: Doubtful	Pine Impregnation: Negative	Pine Impregnation: Specimens Used	Ribes Impregnation: Positive	Ribes Impregnation: Doubtful	Ribes Impregnation: Negative	Ribes Impregnation: Specimens Used	Absence from Ribes: Positive	Absence from Ribes: Doubtful	Absence from Ribes: Negative
Healthy Pines. No Ribes	1	10	0	--	none	--	--	---	?	1		
No Pines Healthy Ribes	4	0	0	---	B.bract	118		---	?	1		
Totals	5	10	0	---	B.bract	118		---	?	1		

No infection was found on either Pines or Ribes.

4. Cowlitz County

a. Record of scouring carried out. Table No. 13 shows the results of scouring in Cowlitz County, classified according to association of hosts.

Table No. 13

Analysis of Scouring, Cowlitz County, Wash.

Association of Hosts	No. of Instances Noted	Pine Impregnation: Positive	Pine Impregnation: Doubtful	Pine Impregnation: Negative	Pine Impregnation: Species Used	Ribes Impregnation: No. Specimens Used	Ribes Impregnation: Positive	Ribes Impregnation: Doubtful	Ribes Impregnation: Negative	Absence from Ribes: Positive	Absence from Ribes: Doubtful	Absence from Ribes: Negative
Healthy Pines. No Ribes	1	4	0	---	none	---	---	---	---	1		
Healthy Pines & Ribes	1	28	0	---	R.bract.	108		---	---			
					R.lac.	3		---	---			
					R.leo.	7		---	---			
					R.brac.	340		---	---			
					R.cog.	11		---	---			
					R.lac.	28		---	---			
					R.leo.	12		---	---			
		17	---	0	R.bra.	6		---	---			
No Pines Ribes Infected	1	none			R.bract.	22		2	[illegible]			
Totals	31	28	0	---	R.brac.	538		8	---			
					R.cog.	11		2	---			
					R.lac.	38		2	---			
					R.leo.	19		2	---			
					R.bra.	6		0	---			

An examination of Table No. 13 shows that in Cowlitz County no infected pines were found, and that pines were scarce. The only part of Cowlitz County in which pines were found, was in the extreme eastern portion, near Mt. St. Helens.

There were 23 Ribes inspection points. Three of these or 13% showed R. bracteosum infection. This would indicate that infection in Cowlitz County was in the introductory stage.

The infected pines referred to in the last column were in the extreme western portion of Skamania County near Spirit Lake.

5. Gray's Harbor County. Gray's Harbor County was only about two-thirds scouted. The southern portion was not covered. Pines in Gray's Harbor County are concentrated in the north and northwestern portions.

a. Record of scouting performed. Table No. 14 shows the results of scouting in Gray's Harbor County, classified according to association of hosts.

An examination of Table No. 13 shows that in Dewitt County no infected pines were found, and that pines were scarce. The only part of Dewitt County in which pines were found, was in the extreme eastern portion, near Mt. St. Helens.

There were 23 miles inspection points. Three of these or 13% showed S. bicolor infection. This would indicate that infection in Dewitt County was in the introductory stage.

The infected pines referred to in the last column were in the extreme western portion of Simonds County near Twin Lick.

5. Grey's Harbor County. Grey's Harbor County was only about two-thirds scouted. The southern portion was not covered. Pines in Grey's Harbor County are concentrated in the north and northwestern portions.

a. Record of scouting performed. Table No. 14 shows the results of scouting in Grey's Harbor County, classified according to association of hosts.

Table No. 14

Analysis of Scouting, Gray's Harbor County Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	10	260	0	--	none	--	--	--	?	?
Pines Healthy Ribes	2	7	0	--	R.bract	25	0	--	100 ft. or less	?
					R.sang.	1	0	--		
Healthy	3	90	0	--	R.bract	26	0	--	101'-300'	
	2	138	0	--	R.bract	49	0	--	301'-500'	?
Pines Healthy Ribes Infected	1	2	0	--	R.bract	30	1	negligible	1500'	?
No Pines Ribes Healthy	19	--	--	--	R.bract	534	0	--	?	?
					R.lax.	50	0	--		
					R.lac.	1	0	--		
					G.div.	2	0	--		
No Pines Ribes Infected	1	--	--	--	R.bract	23	6	3%	?	?
Totals	38	497	0	--	R.bract	687	7	3%		
					R.sang.	1	0			
					R.lax.	50	0			
					R.lac.	1	0			
					G.div.	2	0			
Grand Total						741	7			

An examination of Table No. 14 shows that no infected pines were found, and that only one infected Ribes location was located.

Infection is very definitely in the introductory stage.

6. Island County.

Island County was practically not scouted. Only one inspection was made. Near Oak Harbor, 30 P. monticola were examined near the former location of black currants found infected and pulled in 1922. No infection

Table No. 14

Analysis of Condition, Gray's Harbor County

Inspection

Association of North	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected Bush	Ribes Inspection: % Leaves Infected	Distance from Ribes to Healthy Pines	Distance from Ribes to Infected Pines
Pines Healthy No Ribes	10	250	0	--	none	--	--	--	?	?
Pines Healthy Ribes	8	7	0	--	R. brect.	26	0	--	100 ft. or less	?
					R. sang.	1	0	--		
Ribes Healthy	8	90	0	--	R. brect.	26	0	--	100-300'	
Healthy	2	138	0	--	R. brect.	49	0	--	300-500'	?
Pines Healthy Ribes Infected	1	2	0	--	R. brect.	30	1	Negligible	1800'	?
No Pines Ribes Healthy	19	--	--	--	R. brect.	554	0	--	?	?
					R. lax.	50	0	--		
					R. lac.	1	0	--		
					G. div.	2	0	--		
No Pines Ribes Infected	1	--	--	--	R. brect.	28	6	3%	?	?
Totals	28	487	0	--	R. brect.	687	7	3%		
					R. sang.	1	0			
					R. lax.	80	0			
					R. lac.	1	0			
					G. div.	2	0			
Grand Total						741	7			

An examination of Table No. 14 shows that no infected pines were found, and that only one infected Ribes location was located.

Infection is very definitely in the introductory stage.

6. Island County.

Island County was practically not scouted. Only one inspection was made. Near Oak Harbor, 30 P. monticola were examined near the former location of black currants found infected and pulled in 1922. No infection

was found on the white pines. No Ribes were found.

7. Jefferson County Table No. 15

Jefferson County was scouted in so far as it was accessible. This included the eastern portion, a horseback trip south of Mt. Olympus, and a trip made in the southwestern corner of the county. A large portion of the county lies in the Olympic National Forest, and was not accessible except by the expenditure of more time than was at the disposal of the scouts. Pines were found in greater or less quantities where scouting was performed.

a. Record of scouting performed. Table No. 15 gives the results of scouting in Jefferson County classified according to association of hosts.

was found on the white pines. No Nuns were found.

7. Jefferson County

Jefferson County was scouted in so far as it was accessible. This included the eastern portion, a horseback trip south of Mt. Olympus, and a trip made in the southwestern corner of the county. A large portion of the county lies in the Olympic National Forest, and was not accessible except by the occasional use of more than was at the disposal of the scouts. Mines were found in greater or less quantities wherever scouting was performed.

a. Record of scouting performed. Table 8a. 15 gives the results of scouting in Jefferson County classified according to translation of hosts.

Table No. 15

Analysis of Scouting, Jefferson County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	3	9	0	--	none	--	--	--	?	?
Pines Healthy	2	105	0	--	R.bract.	520	0	--		
					R.acer.	10	0	--	1-100'	?
					R.lac.	6	0	--		
Ribes Healthy	2	89	0	--	R.bract.	60	0	--	101' to 300'	?
	1	2	0	--	R.bract.	1	0	--	301' to 500'	?
					R.acer.	25	0	--		
					R.lax.	5	0	--		
Pines Infected Ribes Healthy	1	1	1	2	R.bract.	1	0	--	?	75ft.
					R.sang.	10	0	--	?	"
					G.lobb.	6	0	--	?	"
	1	12	1	2	R.sang.	8	0	--	100 ft.	150'
Pines Healthy Ribes Infected	1	30	0	--	R.bract.	34	11	10%	50 ft.	?
					R.sang.	9	3	1%	1/8 mi.	?
					G.div.	7	1	1%	"	?
	1	60	0	--	R.lac.	1	0	--	"	?
Pines Infected Ribes Infected	1	24	1	1	R.bract.	7	1	1 leaf	75 ft.	1/8 mi
No Pines Ribes Healthy	11	0	0	--	R.bract.	242	0	--		
					R.lax.	5	0	--	?	?
					R.lac.	1	0	--		
No Pines Ribes Infected	9	0	0	--	R.bract.	135	40	5%	?	?
					R.lac.	12	0	--		
Totals	33	332	3	1½	R.brac.	1000	52	6%		
					R.acer.	35	0	--		
					R.lax.	10	0	--		
					R.sang.	27	3	1%	?	?
					R.lac.	31	0	--		
					G.div.	7	1	1%		
					G.lobb.	6	0	--		
Grand Total						1116	56	5%		

It is well to bring out certain points in Table No. 15:

Table No. 15

Analysis of Scouting, Jefferson County, West Virginia

Association of Boats	No. of Inspection Points	Pine Inspection: Exam-ined	Pine Inspection: In-fected	Pine Inspection: Carcers per In-fected Tree	Spruce Inspection: Species	Spruce Inspection: No. Exam-ined	Spruce Inspection: No. In-fected	Spruce Inspection: % Leaves Infected per Inspected Bark	Distance from Timber to Mooring Place: Mooring Place	Distance from Timber to Mooring Place: In-fected Pine	Distance from Timber to Mooring Place: Pro-tected Spruce
Pines Healthy No Blues	2	9	0	--	none	--	--	--	?	?	
Pines Healthy Blues Healthy	2	105	0	--	R. brace.	320	0	--			
					E. acer.	10	0	--	1-100'	?	
					E. Jac.	6	0	--			
Blues Healthy	2	50	?	--	A. brace.	60	0	--	101' to 300'	?	
					E. Jac.	11	0	--			
	1	2	0	--	A. brace.	1	0	--	301' to 500'	?	
					?. acer.	23	0	--			
					A. Jac.	3	0	--			
Pines Infected Blues Healthy	1	1	1	2	R. brace.	1	0	--	?	?Ft.	
					R. sang.	10	0	--	?	"	
					G. lobb.	6	0	--	?	"	
	1	12	1	2	R. sang.	8	0	--	100 ft.	150'	
Pines Healthy Blues Infected	1	80	0	--	R. brace.	34	11	10%	50 ft.	?	
					R. sang.	9	3	1%	1/8 mi.	?	
					G. div.	7	1	1%	"	?	
	1	80	0	--	A. Jac.	1	0	--	"	?	
Pines Infected Blues Infected	1	24	1	1	R. brace.	7	1	1 leaf	75 ft.	1/8mi	
No Pines Blues Healthy	11	0	0	--	R. brace.	240	0	--			
					R. Jac.	3	0	--	?	?	
					R. Jac.	1	0	--			
No Pines No Blues Infected	9	0	0	--	Rbrace.	135	40	5%	?	?	
					R. Jac.	12	0	--			
Totals	25	322	3	1½	R. brac.	1000	54	8%			
					A. acer.	35	0	--			
					A. Jac.	10	0	--			
					R. sang.	27	3	1%	?	?	
					A. Jac.	31	0	--			
					G. div.	7	1	1%			
					G. lobb.	6	0	--			
					Grand Total	1116	55	5%			

It is well to bring out certain points in Table No. 15:

(1) There were 3 inspections made where pines only were examined. No pine infection was found at these points.

(2) There were 10 inspections made where pines and Ribes occurred in association. At 5 of these points, or 50% of them, either one or both hosts were found infected; 2 of them, or 20% showed pines infected with Ribes healthy; 2, or 20%, showed pines healthy with Ribes infected; while 1 inspection point, or 10% showed both hosts infected. The Ribes infection in this last case was only 1 leaf on 1 bush, owing to the fact that the one canker found had not yet reached the fruiting stage, and hence could not have been responsible for the Ribes infection. Based on evidence in this table, infection conditions in Jefferson County show no intensification and are still in the stage of introduction.

(3) There were 20 inspections made where pines were absent and Ribes only were examined. At 9 of these points, or at 45% of them R. bracteosum showed infection. Of the 10 inspections made where both hosts were present, 3 of them, or 30%, showed Ribes infection, a smaller per cent than at points where pines were absent. This fact is additional evidence of the lack of intensification, and offers further proof that infection is in the stage of introduction.

(4) Still more evidence showing that infection has not progressed beyond the stage of introduction is presented in Table No. 15. Attention is called to the fact that the per cent of leaves infected per infected bush where both hosts are present is even less than that of infected Ribes not associated with pines, or associated with healthy pines. If the stage of intensification had been reached, infection of Ribes associated with infected pines would be much greater than if such infected pines were lacking.

8. King County.

King County was scouted in a fairly satisfactory manner. Scattered pines occur on the coast, and in greater abundance in the eastern portion of the country near the summit of the Cascades.

a. Record of scouting performed. Table No. 16 gives the results of scouting in King County, classified according to association of hosts.

(1) There were 3 inspections made where pines only were examined. No pine infection was found at these points.

(2) There were 10 inspections made where pines and Ribes occurred in association. At 5 of these points, or 50% of them, either one or both hosts were found infected; 2 of them, or 20% showed pines infected with Ribes nearby; 2, or 20%, showed pines nearby with Ribes infected; while 1 inspection point, or 10% showed both hosts infected. The Ribes infection in this last case was only 1 leaf on 1 bush, owing to the fact that the one cankor found had not yet reached the fruiting stage, and hence could not have been responsible for the Ribes infection. Based on evidence in this table, infection conditions in Jefferson County show no intensification and are still in the stage of introduction.

(3) There were 30 inspections made where pines were absent and Ribes only were examined. At 9 of these points, or 45% of them 7, breezeburn showed infection. Of the 10 inspections made where both hosts were present, 3 of them, or 30%, showed Ribes infection, a smaller per cent than at points where pines were absent. This fact is additional evidence of the lack of intensification, and offers further proof that infection is in the stage of introduction.

(4) Still more evidence showing that infection has not progressed beyond the stage of introduction is presented in Table No. 15. Attention is called to the fact that the per cent of leaves infected per infected bush where both hosts are present is even less than that of infected Ribes not associated with pines, or associated with healthy pines. If the stage of intensification had been reached, infection of Ribes associated with infected pines would be much greater than if such infected pines were lacking.

8. King County.

King County was scouted in a fairly satisfactory manner. Scattered pines occur on the coast, and in greater abundance in the eastern portion of the country near the summit of the Cascades.

9. Record of scouting performed. Table No. 16 gives the results of scouting in King County, classified according to associations of hosts.

Table No. 16

Analysis of Scouting, King County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	6	126	0	--	none	--	--	--	?	?
Pines Healthy	2	88	0	--	R.brac.	19	0	--	100 ft.	
					R.lac.	3	0	--	or less	?
Ribes Healthy	1	35	0	--	R.brac.	3	0	--	200 ft.	?
No Pines Ribes Healthy	20	--	--	--	R.brac.	964	0	--	?	?
					R.nig.	8	0	--		
					R.sang.	4	0	--		
					R.lac.	8	0	--		
					G.div.	5	0	--		
No Pines Ribes Infected	6	--	--	--	R.brac.	445	11	54%	?	?
					R.lac.	1	0	--		
					G.div.	2	0	--		
Total	35	249	0	--	R.brac.	1431	11	54%	?	?
					R.nig.	8	0	--		
					R.sang.	4	0	--		
					R.lac.	12	0	--		
					G.div.	7	0	--		
Grand Total						1462	11			

An examination of Table No. 16 shows that no pines were found infected. Of the 29 Ribes inspection points, 6 of them, or 22%, showed Ribes infection. None of the 6 Ribes infection points were in association with pines. Blister rust in King County is still in the introductory stage.

9. Kitsap County.

Pines are quite abundant in Kitsap County, especially so in the general vicinity of Bremerton. Scouting in Kitsap County was completed in a satisfactory manner.

a. Record of scouting performed. Table No. 17 gives the results of scouting in Kitsap County, classified according to association of hosts.

Table No. 15

Analysis of Petition, Pine County, 1949.

Assessment of Roads	No. of Inspection Stations	Pine Inspection			Ribes Inspection				Distance from Ribes Eradication Area	
		Examined	Infected	Certified Free Infected Tree	Species	No. Infected Bush	% Leaves Infected Bush		Infected Area	Infected Area
Timber Liability Rs. Mbr.	8	120	0	--	Hort.	--	--	--	0	0
Class Liability	2	89	0	--	S.Grs.	1	--	--	500 ft.	0
					C.Inc.	4	0	--	or less	0
Rites Liability	1	35	0	--	T.Bre.	5	0	--	200 ft.	0
No Rites Liability	20	---	--	--	S.Grs.	351	0	--		
					R.Nig.	8	0	--		
					R.Sang.	4	0	--		
					C.Inc.	4	0	--		
					R.Gly.	2	0	--		
No Rites Rites Liability					S.Grs.	414	11	54%		
					C.Inc.	1	0	--		
Infected	2	--	--	--	R.Gly.	3	0	--		
Total	33	243	0	--	S.Grs.	761	11	54%		
					R.Nig.	8	0	--		
					R.Sang.	4	0	--		
					R.Inc.	13	0	--		
					R.Gly.	7	0	--		
Grand Total						1482	11	--		

An examination of Table No. 16 shows that no pines were found infected. Of the 29 Ribes inspection points, 6 of them, or 29%, showed Ribes infection. None of the 6 Ribes infection points were in association with pines. Pitch Pine in Kings County is still in the introductory stage.

3. Kitsap County.

Pines are quite abundant in Kitsap County, especially so in the general vicinity of Bremerton. Scouting in Kitsap County was completed in a satisfactory manner.

4. Record of scouting performed. Table No. 17 gives the results of scouting in Kitsap County, classified according to association of hosts

Table No. 17

Analysis of Scouting, Kitsap County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	6	106	0	--	None	--	--	--	?	?
Pines Healthy	2	24	0	--	R.brac.	10	0	--	101'-300'	?
					R.sang.	10	0	--		
Ribes Healthy	1	175	0	--	R.brac.	3	0	--	250 ft.	½ mi.
Pines Infected	1	65	1	1	R.lax.	6	0	--	50 ft.	300'
					G.div.	1	0	--	"	"
Ribes Healthy	1	150	3	1	Cult.red currant	2	0	--	"	150'
Pines Healthy Ribes Infected	3	183	0	--	R.brac.	65	8	1½%	101' to 300'	?
Pines Infected Ribes Infected	1	64	6	7	R.brac.	12	12	17%	20 ft.	100'
					R.sang.	6	3	10%	"	50'
					R.lac.	1	1	20%	"	100'
	1	48	1	1	R.brac.	5	3	4%	"	"
					R.sang.	1	0	--	600 ft.	700'
	1				R.sang.	4	4	95%	25 ft.	25'
					R.lac.	5	2	10%	25 ft.	75'
	1	30	12	1½	G.div.	1	0	--	"	25'
					R.brac.	8	8	75%	300 ft.	100'
					R.sang.	1	1	50%	"	"
	1	50	50	20	R.lac.	1	1	10%	"	"
No Pines Ribes Healthy	3	0	0	--	R.brac.	49	0	--	?	?
					R.sang.	3	0	--		
					G.div.	1	0	--		
No Pines	1	0	0	--	R.brac.	38	4	1%	½ mi.	1 mi.
	1	0	0	--	R.brac.	20	4	12%	1 mi.	?
Ribes Infected	9	0	0	--	R.brac.	90	35	10%	?	?
					R.nig.	7	7	45%		
Totals	32	895	73	15	R.nig.	7	7	46%		
					R.brac.	300	74	21%		
					R.sang.	24	8	58%		
					R.lax.	6	0	--		
					R.lac.	7	4	13%		
					G.div.	3	0	--		
Grand Total						347	93	25%		

Table No. 17

Analysis of Scouting, Kitsap County, Washington

Attention is directed to certain points in Table No. 17.

(1) No infected pines were found except in association with Ribes species.

(2) There were 12 inspections made where pines and Ribes were both present. At 9 of these points, or 75% of them, either one or both of the hosts were infected. Two of the, or 17%, showed pines infected with Ribes healthy; 3, or 25%, showed pines healthy, with Ribes infected; and 4 points, or 33% showed both hosts infected. These figures indicate (a) that infection on pines or on Ribes associated with pines is well distributed and established; and (b) that at 33% of the points, infection conditions are well advanced in the stage of intensification and constitute sources from white further advance of infection can be expected.

(3) There were 14 inspections made where only Ribes were found and inspected. Of these 14 inspections, 11 or approximately 80% showed infected Ribes species, either R. nigrum or R. bracteosum. This would indicate that aecial sources existed sufficiently large and close enough to cause a heavy shower of aecia over Kitsap County.

(4) The average per cent of Ribes bushes infected for different Ribes species in different associations can best be shown by a small table derived from Table No. 17.

Table No. 18

Per Cent of Ribes Infected in Different Associations of Hosts, Kitsap County.

Association of Hosts	Inspection Points	Ribes Infection Per Cent				
		Species	No. Exam.	No. Inf.	% Bushes Infected	% Leaves Inf. per Inf. Bush	% All Leaves Infected
Pines Healthy Ribes Infected	3	R.bract.	65	8	12%	1½%	.2%
Ribes Infected Pines Infected	4	R.bract.	25	23	92%	35%	32 %
		R.sang.	12	8	67%	57%	38 %
		R.lac.	7	4	57%	12%	7 %
		G.div.	1	0	--	--	--
Total			45	35	78%	37%	29%
No Pines Ribes Infected	11	R.nigrum	7	7	100%	45%	45%
		R.bract.	148	43	29%	9%	3%
Total			155	50	32%	14%	4½%

Attention is directed to various points in Table No. 17.

(1) No infected plants were found except in association with Ribes species.

(2) There were 12 inspections made where plants and Ribes were both present. At 9 of these points, or 75% of them, either one or both the hosts were infected. Two of the, or 17%, showed plants infected with Ribes nearby; 8, or 58%, showed plants healthy, with Ribes infected and 4 points, or 33% showed both hosts infected. These figures indicate (a) that infection on plants or on Ribes associated with plants is well distributed and established; and (b) that at 58% of the points, infection conditions are well advanced in the stage of internal infection and constitute a source from which further advance of infection can be expected.

(3) There were 14 inspections made where only Ribes were found and inspected. Of these 14 inspections, 11 or approximately 80% showed infected Ribes species, either R. nigrum or R. bracteosum. This would indicate that local sources existed sufficiently large and close enough to cause a heavy shower of scale over Ribes County.

(4) The average per cent of Ribes bushes infected for different Ribes species in different associations can best be shown by a small table derived from Table No. 17.

Table No. 18

Per Cent of Ribes Infected in Different Associations of Scale. Clinton County.

Location of Scale	Interaction Ribes Species	No. Bushes Inf.	% Bushes Infected	% All Leaves Infected
Ribes Healthy Plant Infected	P. bract.	8	13%	3%
Ribes Infected	R. bract.	20	35%	20%
	R. cyne.	12	8	67%	25%	5%
Plant Infected	R. lac.	7	4	57%	14%	2	1%
	R. div.	1	0	--	--	--
Total		48	76	37%	8%
No Plant Ribes Infected	R. nigrum	9	7	100%	46%	46%
	R. bract.	144	44	89%	24	3%
Total		153	51	33%	14%	4%

The significance of evidence presented in Table No. 18 is that infection on Ribes associated with infected pines is much greater than on Ribes associated with pines not yet infected, or where no pines are present. The greater amount of infection on Ribes associated with infected pines is due to such infected pines and is evidence of intensification, or additional infection of Ribes from nearby pine infection.

It may be noted that in the association of infected pines with infected Ribes there is shown an even greater amount of infection on R. sanguineum than on R. bracteosum. Although it is a well-established fact that R. bracteosum shows a higher susceptibility to the rust than does R. sanguineum, such differences tend to approach the same level when all species of Ribes are in the immediate proximity of fruiting cankers.

It is patent that R. nigrum stands much higher in relative susceptibility to the rust than does R. bracteosum when it is noted that separated by unknown distances from aecial sources, R. nigrum shows 45% of leaves infected as compared to 3% of leaves of R. bracteosum, the next most susceptible Ribes host on the coast.

b. Details of an important pine infection. Following is a detailed description of a pine infection center in Kitsap County:

Name: Paschall's Ranch Infection. Inspection No. 28

Location: 6 miles west of Bremerton, Kitsap County, on road towards seabeck. T. 24 N., R. 1 E., NW 1/4 Sec. 7.

Pine inspection: This infection lies within one of the best young white pine stands known on the coast. Examined 50 P. monticola 11 to 20 years old. Fifty infected with an estimated number of cankers of 20 per infected tree. Time did not permit a proper study of pine infection, but it was estimated that such infection was the result of Ribes infection occurring chiefly in 1920 and 1923. This is the heaviest pine infection known in western United States chargeable to native Ribes species. Practically every pine along the stream was found infected.

Ribes inspection: Ribes species were abundant, especially R. bracteosum, which was found in profusion along the stream running through this infection. Table No. 19 gives the results of Ribes inspection.

Table No. 19

Inspection of Ribes, Paschal's Ranch, Kitsap County

Ribes Species	Number Exam.	Number Inf.	% Leaves Infected per Infected Bush	Per cent Infected Surface Bearing Uredinia	Per cent Infected Surface Bearing Telia	Average Distance from Ribes to Healthy Pines	Average Distance from Ribes to Infected Pines
R.bract.	8	8	75%	10	90	300	100
R.sang.	1	1	50%	20	80	300	100
R.lac.	1	1	10%	20	80	300	100

The significance of evidence presented in Table No. 18 is that infection on Ribes associated with infected pines is much greater than on Ribes associated with pines not yet infected, or where no pines are present. The greater amount of infection on Ribes associated with infected pines is due to such infected pines and is evidence of intensification, or additional infection of Ribes from nearby pine infection.

It may be noted that in the association of infected pines with infected Ribes there is shown an even greater amount of infection on R. rotundifolium than on R. bracteosum. Although it is a well-established fact that R. bracteosum shows a higher susceptibility to the rust than does R. roezlii, such differences tend to approach the same level when all species of Ribes are in the immediate proximity of fruiting cankers.

It is noted that P. ribicum attacks much higher in relative susceptibility to the rust than does R. bracteosum when it is noted that separated by miles or distances from actual sources, R. ribicum shows 48% of leaves infected as compared to 3% of leaves of R. bracteosum, the next most susceptible Ribes host on the coast.

5. Details of an important pine infection. Following is a detailed description of a pine infection center in Kitsap County:

Name: Foesboll's Ranch Infection. Inspection No. 38
Location: 6 miles west of Bremerton, Kitsap County, on road towards seabeck. T. 24 N., R. 1 E., NW 1/4 Sec. 7.
Pine Infection: This infection lies within one of the best young white pine stands known on the coast. Examined 30 P. monticola 11 to 20 years old. Fifty infected with an estimated number of canopies of 30 per infected tree. Time did not permit a proper study of pine infection, but it was estimated that such infection was the result of Ribes infection occurring chiefly in 1920 and 1923. This is the heaviest pine infection known in western United States chargeable to native Ribes species. Practically every pine along the stream was found infected.
Ribes inspection: Ribes species were abundant, especially R. bracteosum, which was found in profusion along the stream running through this infection. Table No. 19 gives the results of Ribes inspection.

Table No. 19

Inspection of Ribes, Foesboll's Ranch, Kitsap County

Ribes Species	Number Exam.	Number Inf.	% Leaves Infected	Infected Ber. Free Berries	Per cent Infected Ber. From Ribes in Vicinity Infected Pines	
			Bush	Terminals	Cells	Pines
R. bract.	6	3	75%	10	80	100
R. cruen.	1	1	25%	30	80	100
R. lac.	1	1	10%	30	80	100

Remarks: The circumstances attending the discovery of this infected area are interesting. On December 18, 1926, our inspector at Seattle intercepted a parcel post package containing 2 P. monticola among other assorted evergreens shipped by Miss P. S. Paschall, Route 1 Charleston, to Mrs. Lubow Barsony, Tucson, Arizona. The shipment was returned to the sender. In correspondence with this office, Mr. S. Edward Paschall, the father of Miss P. S. Paschall, sent in specimens of P. monticola infected with blister rust, and stated that there was a great deal of this type of injury to pines in the vicinity of the source of the two pines sent to Arizona. The field men looked up Paschall's Ranch and found very heavy pine infection.

Mr. Paschall is an elderly man extremely interested in natural sciences. He showed a very commendable desire to cooperate with us in every way, offering the use of his land for the study of the infection. He is interested in the Mountaineers, who have a playground in the immediate region, and who own a tract of land supporting an excellent growth of young white pine. The symbol chosen by the Mountaineers Club is P. monticola, hence they have a very deep interest in the protection of their symbolical tree.

This incident serves as an excellent illustration of the value of quarantine enforcement from two standpoints: (1) Delaying spread of the rust. The fact that the pines were consigned to Arizona instead of to some point in the commercial 5-needled pine range does not alter the importance of the work. The shipment might have been sent to California, Oregon or Idaho. (2) Educational. As a direct result of this incident the Mountaineers Club was informed concerning the seriousness of the disease and its extent in their stands. They are now much interested in the protection of their white pines.

Name: Mountaineers Pine Stand. Inspection No. 29

Location: 6 miles west of Bremerton on road towards Seabeck. On plateau 1/4 mile east of Paschall's Infection, T. 24 N., R. 1 E., Section 7.

Pine inspection: P. monticola very abundant in a stand nearly 100% stocked with thrifty pines about 15 years old. One hundred fifty pines examined, 3 found infected, 1 canker each.

Ribes inspection: Only Ribes found were 2 old abandoned cultivated red currants not infected 50 feet from healthy pines and 150 feet from an infected pine.

Remarks: This infection point, while described separately, in reality belongs with the Paschall Infection, since most probably infection on pines came from the same source as caused the Paschall pine infection.

The Mountaineer's pine stand is situated on a plateau about 200 feet above and 1/4 mile distant from the Paschall infection.

Remarks: The circumstances attending the discovery of this infected area are interesting. On December 16, 1929, our inspector at Seattle intercepted a parcel post package containing 2 P. monticola among other assorted everyreens shipped by Miss P. S. Pascball, Route 1 Charleston, to Mrs. Lubow Berzony, Tucson, Arizona. The shipment was returned to the sender. In correspondence with this office, Mr. S. Elmer Pascball, the father of Miss P. S. Pascball, sent in specimens of P. monticola infected with blister rust, and stated that there was a great deal of this type of injury to pines in the vicinity of the source of the two pines sent to Arizona. The field men looked up Pascball Ranch and found very heavy pine infection.

Mr. Pascball is an elderly man extremely interested in natural sciences. He showed a very commendable desire to cooperate with us in every way, offering the use of his land for the study of the infection. He is interested in the Mountaineers, who have a playground in the immediate region, and who own a tract of land supporting an excellent growth of young white pine. The symbol chosen by the Mountaineers Club is P. monticola, hence they have a very deep interest in the protection of their symbolical tree.

The incident serves as an excellent illustration of the value of quarantine enforcement from two standpoints: (1) Delaying spread of the rust. The fact that the pines were consigned to Arizona instead of to some point in the commercial white-needled pine range does not alter the importance of the work. The shipment might have been sent to California, Oregon or Idaho. (2) Educational. As a direct result of this incident the Mountaineers Club was informed concerning the seriousness of the disease and its extent in their stands. They are now much interested in the protection of their white pines.

Name: Mountaineers Pine Stand. Inspection No. 29.

Location: 5 miles west of Fremont on road towards Snoqualmie Pass. On plateau 1/4 mile east of Pascball's Infection, T. 24 N., R. 7 E., Section 7.

Pine infection: P. monticola very abundant in a stand nearly 100% stocked with thrifty pines about 15 years old. One hundred fifty pines examined. 3 found infected, 1 canker each.

Ribes inspection: Only Ribes found were 2 old abandoned cultivated red currants not infected 80 feet from healthy pines and 150 feet from an infected pine.

Remarks: This infection point, while described separately, in reality belongs with the Pascball Infection, since most probably infection on pines came from the same source as caused the Pascball pine infection.

The Mountaineer's pine stand is situated on a plateau about 800 feet above and 1/4 mile distant from the Pascball infection.

The per cent of pines infected dropped off abruptly on the plateau.

10. Kittitas County.

Pines in Kittitas County are limited to the western portion on the upper east-facing slopes of the Cascades. Scouting in this county was very incomplete. The only scouting performed was that incident to travel to and from the coast region, and was confined to the extreme western portion. No infection on either pines or Ribes was found.

a. Record of scouting performed. Table No. 20 gives the results of scouting classified according to association of hosts.

Table No. 20

Analysis of Scouting, Kittitas County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	1	45	0	--	none	--	--	--	?	?
Pines Healthy Ribes Healthy	1	61	0	--	R.bract.	25	0	--	1'-100'	?
	1	6	0	--	R.bract.	60	0	--	400'	?
Totals	3	112	0	--	R.bract.	85	0	--		

11. Lewis County.

Pines in Lewis County are situated in the eastern portion on the western slopes of the Cascades. The eastern part of the county was satisfactorily scouted. No scouting was performed in that portion of Lewis County lying west of the Pacific highway.

a. Record of scouting. Table No. 21 gives the results of scouting in Lewis County classified according to association of hosts.

The per cent of pines infected dropped off abruptly on the plateau.

J. Klickitat County.

Pines in Klickitat County are limited to the western portion on the upper east-facing slopes of the Cascades. Scouting in this county was very incomplete. The only scouting performed was that incident to travel to and from the coast region, and was confined to the extreme western portion. No infection on either pines or Ribes was found.

a. Record of scouting performed. Table No. 20 gives the results of scouting classified according to association of hosts.

Table No. 20

Analysis of Position, Klickitat County, data.

Association of Plants	No. of Inspections Made	Pine Inspection: Severe	Pine Inspection: Infected	Ribes Inspection: Severe	Ribes Inspection: Infected	Distance Trees Given to: Infected Trees	Distance Trees Given to: Infected Ribes
Pines Healthy	4	49	0	—	None	—	—	0	0
Pines Healthy	1	22	0	—	S. Brect.	25	0	—	1'-10"
Ribes Healthy	1	0	0	—	S. brect.	0	0	—	(20)
Totals	4	113	0	—	S. brect.	25	0	—	

JJ. Lewis County.

Pines in Lewis County are situated in the eastern portion on the western slopes of the Cascades. The eastern part of the county was satisfactorily scouted. No scouting was performed in that portion of Lewis County lying west of the Pacific Highway.

a. Record of scouting. Table No. 21 gives the result of scouting in Lewis County classified according to associations of hosts.

Table No. 21

Analysis of Scouting, Lewis County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	6	69	0	--	None	--	--	--	?	?
Pines Healthy Ribes Healthy	7	201	0	--	R. orac.	11	0	--	1-100'	?
					R. sang.	65	0	--		
					G. div.	17	0	--		
					C. lobb.	20	0	--		
					R. lac.	25	0	--		
Intervening area of infected pines	2	4	0	--	R. orac.	5	0	--	101-300'	?
					R. sang.	9	0	--		
					G. div.	13	0	--		
					R. lac.	5	0	--		
Pines Healthy Ribes Infected	1	750	0	--	R. brac.	37	1	5%	50-100'	?
					G. div.	36	4	10%	30-300'	
					R. lac.	35	0	--	10-100'	
No Pines Ribes Healthy	33	0	0	--	R. brac.	311	0	--		
					R. sang.	33	0	--	?	?
					G. div.	1	0	--		
					R. lac.	6	0	--		
No Pines Ribes Infected	5	0	0	--	R. brac.	350	28	14%	?	
					R. sang.	4	0	--		
					G. div.	4	0	--		
					R. lac.	9	0	--		
Totals	50	1004	0	--	R. brac.	1304	29	14%		
					R. sang.	110	0	--		
					G. div.	70	4	10%		
					C. lobb.	20	0	--		
					R. lac.	70	0	--		
Grand Total						1474	33	13%		

Table [illegible]

Analysis of Housing, Davis County, [illegible]

Association	No. of Inspected	Plan Inspection			Pipe Inspection			Laterals from Pipe Line
		Connected to Sewer	Defective Connection	Improperly Trapped	Defective Joints	Infiltration	Improper Manholes	Improper Flushing Devices
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Plano								
Bentley								
No Name	4	54	0	—	None	—	—	—
Plano					[illegible]	0	—	[illegible]
Bentley	9	201	0	—	[illegible]	0	—	
Elmo					[illegible]		—	
Bentley					[illegible]	20	—	
					[illegible]		—	
	4	6	0	—	[illegible]	2	—	[illegible]
					[illegible]	0	—	
					[illegible]	0	—	
					[illegible]	0	—	
Plano					[illegible]	27	1	81
Bentley	1	780	0	—	[illegible]	0	0	104
Elmo					[illegible]	32	3	—
Treated								
No Name					[illegible]	0	—	
Utah	12	0	0	—	[illegible]	0	—	
Poultry					[illegible]	0	—	
					[illegible]	0	—	
No Name					[illegible]	20		
Utah	3	0	0	—	[illegible]	0	—	
Located					[illegible]	4	—	
					[illegible]	0	—	
Bentley	30	1204	0	—	[illegible]	25	16	
					[illegible]		—	
					[illegible]	4	12	
					[illegible]	0	—	
					[illegible]	0	—	
Total								

An examination of Table No. 21 shows the following facts:

1. No pine infection was found.

2. There were 10 inspections made where both hosts were present. Only one of these points, or 10%, showed Ribes infection. At this point the 4 infected G. divaricata and 1 R. bracteosum were at quite widely separated distances and growing in the midst of excellent young white pines. A diligent search for cankers on associated pines failed to show infection.

3. There were 37 inspections made of Ribes with pines absent. At 5 of these points, or at approximately 13% of them, infected R. bracteosum was found.

4. The belief that infection in the area scouted in Lewis County has not reached the stage of intensification, and is still in the introductory stage is based on the following evidence: (a) The per cent of infected Ribes locations where pines are associated is no greater than where pines are absent. (b) The per cent of leaves infected per infected bush at points where pines are associated with infected Ribes is no greater than where pines are absent. If infection had reached the intensification stage we would expect evidence presented in (a) and (b) to be reversed.

12. Mason County.

Pines in Mason County are scattered throughout the northern two-thirds of the county. The county was satisfactorily scouted except in the extreme eastern portion.

a. Record of scouting performed. Table No. 22 gives the results of scouting classified according to association of hosts.

In examination of Table No. XI shows the following facts:

1. No pine infection was found.

2. There were 10 inspections made where both hosts were present. Only one of these pairs, or 10%, showed Ribes infection. It is point the 4 infected R. lacustre and 1 R. bracteosum were at quite widely separated distances and growing in the midst of exceedingly vigorous pines. A diligent search for chancres on associated pines failed to show infection.

3. There were 37 inspections made of Ribes with pines absent. 14 of these points, or at approximately 13% of them, infected R. bracteosum was found.

4. The belief that infection in the area counted in Lewis County has not reached the stage of intensification, and is still in the introductory stage is based on the following evidence: (a) The per cent of infected Ribes locations where pines are associated is no greater than where pines are absent. (b) The per cent of leaves infected per infected bush at points where pines are associated with infected Ribes is no greater than where pines are absent. If infection had reached the intensification stage we would expect evidence presented in (a) and (b) to be reversed.

12. Mason County.

Pines in Mason County are scattered throughout the northern two-thirds of the county. The county was satisfactorily scouted except in the extreme eastern portion.

a. Record of scouting performed. Table No. 12 gives the results of scouting closely for cankers in association of hosts.

Table No. 22

Analysis of Scouting, Mason County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	3	194	0	--	none	--	--	--		?
Pines Healthy Ribes Healthy	4	19	0	--	R.bract.	90	0	--	101'-300'	
					R.sang.	8	0	--		
					G.div.	2	0	--		
					R.lac.	1	0	--		
	1	242	0	--	R.bract.	1	0	--	1000 ft.	?
					R.sang.	1	0	--		
					G.div.	1	0	--		
Pines Infected Ribes Healthy	1	50	4	1	R.bract.	12	0	--	50 ft.	100'
Pines Healthy Ribes Infected	1	60	0	--	R.bract.	75	1	50%	301'-500'	?
					R.sang.	1	0	--		
	1	21	0	--	R.bract.	15	10	8%	900'-1500'	?
No Pines Ribes Healthy	9	0	0	--	R.bract.	278	0	--	?	?
					G.div.	2	0	--		
No Pines Ribes Infected	7	0	0	--	R.bract.	250	17	3⅓	?	?
					G.div.	8	0	--		
					R.lac.	3	0	--		
Totals	27	586	4	1	R.bract.	721	28	7%		
					R.sang.	10	0	--		
					G.div.	13	0	--	?	?
					R.lac.	4	0	--		
Grand Total						74[illegible]	28	7%		

It is well to bring out certain points in Table No. 22:

1. There were 8 inspections made where both pines and Ribes were associated. Of the 8 inspection points, 3 or 37½%, showed one or the other of the hosts infected. There was 1 point, or 12½%, showing pines infected with Ribes healthy; 2, or 25%, showed pines healthy with Ribes infected. No infection was found where both hosts were infected.

2. There were 16 inspections made where pines were absent and

Table No. 22

Infection of Pruning, Scorch Cracks, Description

Association of Plant Diseases	No. of Inspections	Time Inspected in			Tree Inspected			Distance Cleared Within to
		Summer	Fall	Winter	No. Examined	No. Infected	Per Cent Infected	Type of Cankers Found
Plums only	9	124	0	—	None	—	—	—
Plums and Ribes	4	12	0	—	5 Trees 5 Vines 5 Ribs 5 Lots	0 0 2 0	— — — —	— 101'- 200'-
Ribes only	1	140	0	—	1 Trees 1 Vines 1 Ribs	1 1 0	— — —	— 1200'-FL
Plums Infected with Ribes	1	87	4	1	1 Trees	1	—	0'-FL 100'
Plums Infected with Ribes	1	87	3	—	1 Trees 1 Vines	1 1	80% —	101'- 200'-
Ribes Infected with Plums	1	71	3	—	1 Trees	1	80	900'- 1200'-
No Plums Ribes Healthy	8	0	0	—	1 Trees 1 Vines 1 Lots	0 0 0	— — —	—
No Plums Ribes Infected	7	0	0	—	1 Trees 1 Vines 1 Lots	0 1 1	— — —	0'-FL —
Totals	34	124	4	1	1 Trees 1 Vines 1 Ribs 1 Lots	1 0 0 0	2% — — —	1 — —
					Grand Total			

It is well to bring out certain points in Table No. 22:

1. There were 8 inspections made where both pines and Ribes were associated. Of the 8 inspection points, 3 or 37½%, showed one or the other of the hosts infected. There was 1 point, or 12½%, showing pines infected with Ribes nearby; 2, or 25%, showed pines nearly with Ribes infected. No infection was found where both hosts were infected.

2. There were 16 inspections made where pines were absent and

Ribes only were inspected. Of these 16 inspections, 7, or approximately 44%, showed R. bracteosum infected.

3. R. bracteosum was the only Ribes species found infected in Mason County. The infection of R. bracteosum in different associations can well be shown in Table No. 23, derived from Table 22.

Table No. 23

Infection of R. bracteosum in Different Associations of Hosts, Mason County

Association of Hosts	Inspection Points	Infection of Ribes bracteosum				
		Exam.	Inf.	Per cent Bushes Infected	% Leaves Infected per Infected Bush	% Leaves Infected per Bush Examined
Pines Healthy Ribes Infected	2	90	11	12%	12%	1½%
No Pines Ribes Infected	7	250	17	7%	3½%	0.2%

The significance of data presented in Table No. 23 is that the per cent of infection of R. bracteosum is much higher where pines were associated than where they were absent. This fact would indicate that an unknown pine infection existed where the two hosts were associated. In the absence of positive proof to the contrary, infection in Mason County must be considered as being in the stage of introduction.

b. Details of pine infection. There is given below a description of the one pine infection found in Mason County.

Name: South End Hoods Canal Infection. Inspection No.3.
Location: South end of Hoods Canal on Skykomish Indian Reservation. T. 21 N., R. 4 W., Sec. 10.
Inspectors: Training crew. July 30, 1927.
Pine inspection: Pines here are in a seed-tree group. They are growing on a sphagnum moss ledum swamp site, where conditions for pine growth are very poor. As a result the pines show very slow growth and are covered with lichens. Trees average 20 years of age and 10 feet in height. There were 50 P. monticola examined, 4 found infected, one canker each. Canker analysis showed 3 cankers fruited once on 1920, 1921, 1922 years of growth infected; 1 canker showed pycnial scars on 1922 pine growth.
Ribes inspection: There were 12 R. bracteosum examined, and none found infected.
Remarks: This area was first found by Goodding and Putnam

Ribes only were inspected. Of these 16 inspections, 7, or approximately 44%, showed R. grossularia infected.

3. R. bracteosum was the only Ribes species found infected in Mason County. The infection of R. bracteosum in different associations can well be shown in Table No. 23, derived from Table [illegible].

Table No. 23

Infection of R. bracteosum in Different Associations of Trees, Mason County

Association of Trees	Inspection Points	Ribes bracteosum			
		Num.	Inf.	For each Num. Inspected	% Leaves Infected per Bush Examined
Pinus Ponderosa Ribes Irrigated	2	30	11	1/3	1/4
No Pinus Ribes Irrigated	7	[illegible]	17	1/5	0.8%

The significance of data presented in Table No. 23 is that the per cent of infection of R. bracteosum is much higher where pines were associated than where they were absent. This fact would indicate that an unknown pine infection exists where the two hosts were associated. In the absence of positive proof to the contrary, infection in Mason County must be considered as being in the stage of introduction.

b. Details of pine infection. There is given below a description of the one pine infection found in Mason County.

Name: South End Woods Canal Infection. Inspection No. 3.
Location: South end of Woods Canal on Skokomish Indian Reservation. T. 21 N., R. 4 W., Sec. 10.
Inspectors: Training crew. July 30, 1927.
Pine Inspection: Pines here are in a seed-tree group. They are growing on a sphagnum moss Indian swamp site, where conditions for pine growth are very poor. As a result the pines show very slow growth and are covered with lichens. Trees average 20 years of age and 10 feet in height. There were 30 P. monticola examined, 4 found infected, one canker each. Canker analysis showed 5 cankers fruited once on 1930, 1933, 1932 years of growth infected; 1 canker showed fruiting scars on 1932 pine growth.
Ribes Inspection: There were 12 R. bracteosum examined, and none found infected.
Remarks: This area was first found by Goodding and Putnam

on March 30, 1927. It was shown to the scouts during the training period in order for them to see the effect of blister rust on slow-growing pines.

13. Pierce County.

Pines in Pierce County are almost entirely confined to the eastern edge of Pierce County, on the slopes of Mt. Ranier. Scouting was performed in a general manner over the entire county, with special attention given to the eastern portion.

a. Record of scouting performed. Table No. 24 gives the results of scouting performed classified according to association of hosts.

on March 31, 1927. 1b per sheep to the county during the training period in order for them to see the effect of blister rust on sheep grazing plots.

16. Pierce County.

Pines in Pierce County are almost entirely confined to the eastern edge of Pierce County, on the slopes of Mt. Rainier. Scouting was performed in a general manner over the entire county, with special attention given to the eastern portion.

9. Record of scouting performed. Table 6a. 24 gives the results of scouting performed classified according to association of hosts.

Table No. 24

Analysis of Scouting, Pierce County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	7	180	0	--	0	0	0	0	?	?
Pines Healthy Ribes Healthy	7	106	0	--	R. brac.	60	0	0		
					R. lax.	40	0	0		
	2	80	0	P. albi.	R. sang.	8	0	0	1'-100'	?
					R. visc.	45	0	0		
					R. lac.	89	0	0		
	1	0	0	--	R. brac.	100	0	0		
					R. sang.	1	0	0	300'	?
Pines Healthy Ribes Infected	1	2	0	--	R. div.	100	1	2	¼ mile	?
					R. sang.	25	0	0	¼ mile	
					R. lac.	40	0	0	¼ mile	
No Pines Ribes Healthy	16	0	0	--	R. nigr.	17	0	0		
					R. brac.	186	0	0		
					R. div.	8	0	0	?	?
					R. sang.	22	0	0		
					R. lac.	32	0	0		
No Pines Ribes Infected	2	0	0	--	R. brac.	5	1	1	?	?
					R. div.	10	1	1	?	?
					R. sang.	8	1	1	?	?
Totals	36	368	0		R. nig.	17	0	0		
					R. brac.	341	1	1		
					R. div.	118	2	1.5		
					R. lax.	40	0	0	?	?
					R. sang.	74	1	1		
					R. visc.	45	0	0		
					R. lac.	151	0	0		
Grand Total						900	4	Av. 1.4	?	?

Table No. 24

Analysis of Economic, Fiance Domain, Realization

Association of Ideals	No. of Associations Points	Time Impression Learned Land	Time Impression Learned Fac- tual	Time Impression Learned Free Question	Time Impression Number of Items Used	Time Impression Number of Items Forgotten	Time Impression Learned Per Cent Forgotten Read	Difficulty from Time to Be Learned Reality Time	Difficulty from Time to Be Learned Time Con- sumed Time
Finance Reality to Time	7	150	0	--	0	0	0	1	1
Finance Reality Time Reality	7 4	106 80	0 0	-- f.obl.	80 40 8 45 20 20	0 0 0 0 0 0	0 0 0	1 "100"	1
	1	0	6	--	100 1	0 0	0 0	100"	1
Finance Reality Mines Injected	1	1	0	--	100 40 60 20	1 0 0 0	0 0 0	1/2 mile 1/2 mile 1/2 mile	1
No Time Mines Reality	16	0	0	--	17 180 8 40 20 20	0 0 0 0 0 0	0 0 0	1	1
No Time Mines Injected	4	0	0	--	8 10 8 1	1 1 0 1	1 1 1	1 1 1	1 1 1
Totals	45	346	0		47 401 118 40 70 40 20 187	0 1 3 0 1 0 0 0	0 1 1.5 0 1 0 0 0	1	1
Grand Total					500	4	14. 1.5	1	1

Certain points in Table No. 24 need to be brought out:

1. No pine infection was found.

2. There were 11 inspections made where both hosts were present. At only one of these points was infection found on Ribes species. At this point there was found 1 G. divaricata having 2% of its leaves infected.

3. There were 18 inspections of Ribes made where pines were absent. Of these 18 points, 2 showed 3 Ribes species infected, namely: 1 R. bracteosum, 1% of leaves infected; 1 G. divaricata, 1% of leaves infected; and 1 R. sanguineum, 1% of leaves infected.

4. Infection in Pierce County is very definitely in the stage of introduction.

14. Skagit County.

Pines in Skagit County are limited chiefly to the eastern portion, on the slopes of the Cascades. In particular, good stands of young white pine occur along the Skagit River in the vicinity of Concrete and east to the sources of the river. General scouting was performed over the entire county.

a. Record of scouting performed. Table No. 25 gives the results of scouting classified according to association of hosts.

Certain points in Table No. 24 need to be brought out:

1. No pine infection was found.

2. There were 11 inspections made where both hosts were present. At only one of these points was infection found on Ribes species. At this point there was found 1 R. divaricata having 2% of its leaves infected.

3. There were 17 inspections of Ribes made where pines were absent. Of these 18 points, 2 showed 5 Ribes species infected, namely: 1 R. brecheense, 1% of leaves infected; 1 G. divaricata, 1% of leaves infected; and 3 R. sanguineum, 1% of leaves infected.

4. Infection in Pierce County is very definitely in the stage of introduction.

14. Skagit County.

Pines in Skagit County are limited chiefly to the eastern portion, on the slopes of the Cascades. In particular, good stands of young white pine occur along the Skagit River in the vicinity of Concrete and east to the sources of the river. General scouting was performed over the entire county.

a. Record of scouting performed. Table No. 25 gives the results of scouting classified according to association of hosts.

Table No. 25

Analysis of Scouting, Skagit County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	3	17	0	--	none	0	0	--	?	?
Pines Healthy Ribes Healtly	1	1	0	--	G.div.	1	0	--	75'	?
Pines Infected	1	338	1	1	R.sang.	3	0	--	100'	500'
Ribes	1	75	4	1.5	G.div.	2	0	--	200'	300'
Healthy	1	50	1	3	G.div.	2	0	--	100'	"
Pines					R.brac.	10	3	50%	1 mile	
Healthy	1	1	0	--	R.sang.	11	0	--	1 mile	?
Ribes Infected	1	0	0	--	R.brac.	5	2	10%	1 mile	?
Pines	1	58	1	2	R.brac.	61	1	5%	200'	½ mi.
Infected	1	10	1	1	R.sang.	2	2	20%	250'	300'
Ribes					R.brac.	4	3	28	250'	250'
Infected	1	15	2	1.5	R.lac.	1	0	--	"	"
No Pines Ribes					R.brac.	5	0	--		
Healthy	2	0	0	--	R.sang.	2	0	--	?	?
No Pines Ribes Infected	12	0	0	--	R.brac.	267	29	7.3%	?	?
Totals	26	565	10	1.5	R.brac.	352	38	12.4%		
					R.sang.	18	2	20%		
					G.div.	5	0	--		
					R.lac.	1	0	--		
Grand Total						376	40	12.8%		

Attention is called to certain points in Table No. 25:

1. No pine was found infected except where associated with Ribes.

2. There were 8 inspections made where both hosts were associated. At 7, or 87½%, of them, one or both of the hosts were found infected; At 3, or 37½% of them pines were infected with Ribes healthy; at 2, or about 25%, pines were healthy with Ribes infected; and at 3, or 37½%,

Table No. 25

Analysis of Scouting, Knox County, Washington

Associated with Beetle	No. of Inspections	Pine Inspection			Ribes Inspection				Distance from Ribes to
		Examined	Infected	Cankers per Infected Tree	Species	No. Infected	No. Infected per Tree	I leaves Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	3	17	0	--	none	0	0	--	?	?
Pines Healthy Ribes Healthy	1	1	0	--	R. div.	1	0	--	75'	?
Pines Infected	1	229	1	1.	R. cong.	2	0	--	100'	200'
Ribes Healthy	1	76	4	1.8	R. div.	2	0	--	200'	200'
	1	89	1	1	R. div.	2	0	--	100'	"
Pines Healthy Ribes	1	1	0	--	R. prae.	10	2	80%	1 mile	?
					R. cogn.	11	0	--	1 mile	
Infected	1	0	0	--	R. prae.	8	2	10%	1 mile	?
Pines Infected	1	56	1	2	R. prae.	61	1	2%	200'	+ mi.
	1	10	1	1	R. cogn.	2	2	20%	234'	300'
Ribes Infected	1	15	2	1.5	R. prae.	4	3	2%	361'	25'
					R. leo.	1	0	--	"	"
No Pines Ribes Healthy	2	0	0	--	R. prae.	5	0	--	?	?
					R. rubr.	8	0	--		
No Pines Ribes Infected	12	0	0	--	R. prae.	247	20	7.	?	?
Totals	26	566	10	1.5	R. prae.	301	28	7.		
					R. cogn.	15	2	20%		
					R. div.	2	0	--		
					R. leo.	1	0	--		
Grand Total						376	41	12.		

Attention is called to certain points in Table No. 25:

1. No pine was found infected except where associated with Ribes.

2. There were 8 inspections made where both hosts were associated. At 7, or 87½, of them, one or both of the hosts were found infected; At 3, or 37½ of them pines were infected with Ribes healthy; at 3, or 37½, about 25% pines were healthy with Ribes infected; and at 3, or 37½,

both hosts were found infected. These figures indicate that infection has reached the intensification stage, in at least 37½% of points where both hosts were associated.

3. There were 14 inspections of Ribes made where pines were absent. Of this total 12, or approximately 85% showed R. bracteosum infection. This is a high percentage of infection points where pines were not present, and indicates that aecial sources must have existed in abundance to have caused this widespread infection of R. bracteosum.

4. The per cent of infection of Ribes in the different associations of hosts can best be shown in a separate table, Table No. 26, derived from Table No. 25.

Table No. 26

Ribes Infection in Different Associations of Hosts
Skagit County

Association of Hosts	No. of Inspection Points	Ribes Infection					
		Species	Exam.	Inf.	% Bushes Inf.	% Leaves Infected per Infected Bush	% Leaves Infected per Bush Examined
Pines Healthy Ribes Infected	2	R.bract.	15	5	33-1/3	34%	11.3%
		R.sang.	11	0	--	--	--
Pines Infected Ribes Infected	3	R.bract.	65	4	6%	22%	1.0%
		R.sang.	2	2	100%	20%	20%
		R.lac.	1	0	--	--	--
No Pines Ribes Infected	12	R.bract	267	29	11%	7.3%	.7%

An examination of Table No. 26 shows that the per cent of leaves infected per bush examined is least at inspection points where pines are absent. It may be observed that infection of Ribes is higher at points where pines were healthy than where they were found infected. The significance of this fact is that pine infection is very scarce, and that at points where healthy pines were reported, it is probable pine infection occurs which was not discovered.

All pines infected were found in the eastern part of the county where pines are abundant. This is much more serious than if such infected pines were scattered individuals growing outside of the area of abundant pine growth. Since much of the pine growing area is inaccessible, it means that very probably a great many pine infections exist not yet discovered.

15. Skamania County. Skamania County is in a region of rugged

both hosts were found infected. These figures indicate that infection has reached the intensification stage, in at least 37½ of points where both hosts were associated.

3. There were 14 inspections of Ribes made where pines were absent. Of this total 12, or approximately 86% showed R. bracteosum infection. This is a high percentage of infection points where pines were not present, and indicates that asocial sources must have existed in abundance to have caused this widespread infection of R. bracteosum.

4. The per cent of infection of Ribes in the different associations of hosts can best be shown in a separate table, Table No. 26, derived from Table No. 25.

Table No. 26

Ribes Infection in Different Associations of Hosts
Shasta County

Association of Hosts	No. of Inspection Points	Species	Pines	Inf.	Ribes Inf.	Ribes Infected per Inf. Bush	% Leaves Infected for Each Species
Pines Healthy		P. brevi.	15	3	5%-1/2	24	11.5%
Ribes Infected	3	R. sang.	11	0	--	--	--
Pines Infected		P. brevi.	15	4	5%	2+	1.0%
Ribes Infected		R. sang.	8	3	1000	333	--
	1	R. lac.	1	1	--	--	--
No Pines Ribes Infected	12	R. brevi.	687	23	1%	7.7%	.7%

Of pines infected were found in the eastern part of the county where pines are abundant. This is much more serious than if such infected pines were scattered individuals growing outside of the area of abundant pine growth. Since much of the pine growing area is inaccessible, it means that very probably a great many pine infections exist not yet discovered.

15. Shasta County. Shasta County is in a region of rugg

topography. It is occupied entirely by the Cascades. Pines are well distributed throughout the county, and at points are relatively abundant. The county was scouted generally, but not as completely as was desirable owing to the fact that scouts were called in a month ahead of time in order to scout in the Inland Empire.

a. Record of scouting performed. In scouting Skamania County difficulty was experienced in finding good associations of pines and Ribes. In the northwest portion near Mt. St. Helens, pines and R. bracteosum and R. laxiflorum were found associated quite frequently, but in the southern part of the county in the vicinity of Wind River there was abundant pine growth but very few associated Ribes species.

Table No. 27 gives a record of scouting performed classified according to association of hosts.

Table No. 27

Analysis of Scouting, Skamania County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Healthy Pines No Ribes	*P.m. 19 P.s. P.l.	1,223 10 2	0	—	—	—	—	—	?	?
Healthy Pines Healthy Ribes	9	2,269	0	—	R.brac.	150	0	—	100 ft. or less	?
					R.sang.	6	0	—		
					R.lax.	135	0	—		
					R.lac.	47	0	—		
					R.visc.	20	0	—		
					G.div.	7	0	—		
	1	0	0	—	R.brac.	5	0	—	501-1000	?
Infected Pines & Ribes	1	50	14	3½	R.brac.	5	0	—	75'	100'
					R.lax.	105	102	10-75%	10'-50'	10'-50'
					R.lac.	13	7	2%	25'	25'
No. Pines R. Ribes	5	0	0	—	R.brac.	206	0	—		
					R.sang.	15	0	—	?	?
Total	35	3,554	14	3½	R.brac.	375	0	—		
					R.sang.	21	0	—		
					R.lax.	240	102	10-75%		
					R.lac.	59	7	2%		
					R.visc.	20	0	—		
					G.div.	7	0	—		
Grand Total						700	109			

*P.m.—Pinus monticola; P.s.—P. strobus; P.l.—P. lambertiana.

topography. It is occupied entirely by the Cascades. Pines are well distributed throughout the county, and at points are relatively abundant. The county was scouted generally, but not as completely as was desirable owing to the fact that scouts were called in a month ahead of time in order to scout in the Inland Empire.

e. Record of scouting performed. In scouting Skamania County difficulty was experienced in finding good associations of pines and Ribes. In the northwest portion near Mt. St. Helens, pines and R. bracteosum and R. laxiflorum were found associated quite frequently, but in the southern part of the county in the vicinity of Wind River there was abundant pine growth but very few associated Ribes species.

Table No. 37 gives a record of scouting performed classified according to association of hosts.

Table No. 37

Analysis of Scouting, Skamania County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Infected	Infections per Infected Tree	Ribes Inspection: Species	Examined	Infected	No. Infected per Acre	Distance from Pines to Infected Ribes: Heavily Infected Pines	Infected Pines
Healthy Pines No Ribes	4 (1.m., 10 p.e.)	1,233	0	—	—	—	—	—	?	?
Healthy Pines Healthy Ribes	8	1,849	0	—	R. bract., R. sang., R. lac., R. lac., R. visc., R. viv.,	150, 8, 128, 47, 20, 7	0, 0, 0, 0, 0, 0	—, —, —, —, —, —	100 ft. or less	?
Infected Pines & Ribes	1	0	0	—	R. bract.,	5	0	—	?	?
No. Pines No. Ribes	5	0	0	—	R. bract., R. lac., R. lac., R. visc.,	8, 108, 19, 200	0, 104, 7, 0	—, 10-20', 20', —	75', 20'	100', 25'
Total	46	3,82+	14	.4%	R. bract., R. sang., R. lac., R. lac., R. visc., R. viv., R. div.,	179, 11, 200, 28, 40, 7	0, 0, 104, 7, 0, 0	—, —, 10-75', 25', —, —		
Grand Total						703	118			

*P.m.—Pinus monticola; P.a.—P. albicaulis; P.l.—P. Lambertiana.

Attention is directed to certain points in Table No. 27.

1. There was a large percentage of inspections made where pines only were found, 19 out of 35 points. These 19 inspections of pines only were made chiefly in the southern portion of the county where young pines were plentiful, and associated Ribes species, scarce.

2. Only one infection was found in the county. At this point both pines and Ribes species, R. laxiflorum, and R. lacustre were found infected.

b. Details of pine infection. The solitary infection point found is of considerable interest because it is the southernmost pine infection known in the west. Details of this infection are given following:

Name: Spirit Lake Infection. Inspection No. 6

Location: 3.8 miles east of Y.M.C.A. camp on Spirit Lake, eight-tenths of a mile west of west end of National Forest boundary, which is also boundary between Clarke and Skamania counties. On Toutle River. T. 9 N., R. 5 E., Sec. 18.

Inspectors: Joy, Taylor, Putnam, August 20, 1927. Detwiler, Goodding, Putnam, October 15, 1927.

Situation: This infection occupies approximately an acre of bottom land known as the Bright homestead, cleared 17 or 18 years ago and now grown up to white pine, Douglas fir and hardwoods 10 to 16 years old. On the western edge lies the Toutle River. On the eastern portion of the acre is a small stream flowing through a live swamp. The acre is surrounded and fenced in on all sides by a dense growth of white pine, hemlock, and Douglas fir, 81 to 100 years old.

The soil is sandy on this cleared space. Above and below this area the soil is made up chiefly of pumice stones from Mt. St. Helens, lighter than water. White pine grows on this pumice formation in large numbers, but the growth is very slow. Thru the pumice formation flow many small streams, bordered by willow and poplar, and supporting large numbers of R. laxiflorum and R. bracteosum. On several of these streams Ribes were examined, but no infection was found above the infection. Below this point about 4 miles, in Clarke County, a small amount of infection was found.

The altitude of this infection is 2,678 feet above sea level as evidenced by a U. S. Geological Survey benchmark on the area.

Pine inspection: There were 80 P. monticola examined, 14 found infected. Infection was particularly heavy in the live swamp south of the road under a partial cover of deciduous trees. Table No. 28 gives the details of pine infection found.

Table No. 28

Individual Pine Infection
Spirit Lake Plot, Skamania County

Pine No.	Age (yrs)	Height (feet)	Crown Class	No. Cankers		Remarks
				Trunk	Branch	
1	15	9	Dominant	0	1	R.lax.15' away.Infection slight
2	16	10	"	0	1	" " " " "
3	15	10	"	0	1	" 10' " " "
4	12	7	"	0	13	" 5' " " heavy
5	16	7	"	0	5	" " " " "
6	16	8	"	0	1	" 10' " " "
7	15	6	"	0	1	" " " " "
8	13	5	"	0	5	In midst of R.lax. heavily infected.
9	10	3	Co-dominant	0	1	R.lax. 8' away, 100 per cent infected.
10	15	13	Dominant	0	2	R.lax.10' away.Infection heavy
11	10	3	Co-dominant	1	4	R.lax.2'away.Inf.heavy.Round brown shrunken areas base needles

Table No. 28 brings out the close association between infected pines and R. laxiflorum.

Canker analysis: Table No. 29 gives the stage of canker development and year of growth infected as found August 20, 1927.

Table No. 29

Analysis of Cankers Spirit Lake Plot, Skamania County

Year of Growth Infected	Number of Cankers				
	First Symptoms	Juvenile	First Pycnia	Pycnial Scars	Produced Aecia 1st Time
1925		4		2	
1924	3	8	1	5	
1923		3	2	9	1

Apparently there was a wave of pine infection resulting from infection of Ribes in 1924 and 1925, and possibly in 1926.

373 361

Table No. 28

Individual Pine Infection
Spirit Lake Plot, Skamania County

Pine No.	Age (yrs)	Height (feet)	Crown Class	No. Cankers Trunk	No. Cankers Branch	Remarks
1	15	9	Dominant	0	1	R.Jax.15' away.Infection slight
2	16	10	"	0	1	" " " " " "
3	15	10	"	0	1	" 10' " " "
4	12	7	"	0	12	" 8' " " heavy
5	16	7	"	0	5	" " " " "
6	16	8	"	0	1	" 10' " " "
7	15	8	"	0	1	" " " " "
8	13	8	"	0	6	In midst of R.Jax. heavily infected.
9	10	3	Co-dominant	0	1	R.Jax. 8' away, 100 per cent infected.
10	15	13	Dominant	0	3	R.Jax.10' away.Infection heavy
11	10	3	Co-dominant	1	4	R.Jax.3' away.Inf.heavy.Round brown crumbling areas base needles

Table No. 28 brings out the close association between infected pines and I. lariciformm.

Canker analysis: Table No. 29 gives the stage of canker development and year of growth infected as found August 20, 1927.

Table No. 29

Analysis of Cankers Spirit Lake Plot, Skamania County

Year of Growth Infected	Number of Cankers				Remarks
	First Symptoms	First Dyeing	Pycnial Scars	Produced Re-cia Last Time	
1925		4	2		
1924	3	3	1	6	
1923		5	1	3	1

Apparently there was a wave of pine infection resulting from infection of Blbes in 1924 and 1925, and possibly in 1926.

On October 15, 1927, there was found a canker fruited twice on 1921 year of growth. This was the oldest canker found, and was clearly of older origin than the other cankers found. Also in October, 1927, there were many first symptoms, small circular infections 1/8 to 1/2 inches in diameter, around the bases of needles. These young infections were not visible on August 20, 1927.

Ribes inspection:

Table No. 30

Inspection of Ribes, Spirit Lake Infection
Skamania County, August 20, 1927.

Ribes Species	Number Examined	Number Inf.	% Leaves Infected per Infected Bush	Per cent Infected Surface Bearing Uredinia	Per cent Infected Surface Bearing Telia	Average Distance from Ribes to Healthy Pines	Average Distance from Ribes to Infected Pines
R.lacustre	12	7	2%	20	80	25 ft.	25 ft.
N. of road R.laxiflorum	5 clumps	2 clum.	10%	80	20	50 ft.	50 ft.
In live swamp R.laxiflorum	100	100	75%	30	70	10 ft.	10 ft.
R.bracteosum*	5	0	--	--	--	75 ft.	100 ft.

*Small bushes, not over 10 feet live stem per bush.

Attention is called to the fact that infection on R. laxiflorum on north side of road showed 80% of infected surface bearing uredinia, and 20% bearing telia. This large percentage of uredinial production indicates that infection on the Ribes concerned is of recent origin.

Ribes laxiflorum on this plot occurs in large clumps of bushes averaging about 1 foot in height. It was estimated that 10% of the actual ground space north of the road was occupied by R. laxiflorum, and 30% on the south side of the road.

Remarks: Inasmuch as this pine infection is the southernmost known and since no other pine infection was found within 100 miles, it was deemed advisable to destroy all pines on the plot in the hope of reducing the aecial sources affecting Oregon and points south. The present owners of the property were written to, asking their permission for the destruction of the pines. The letters were returned unclaimed and state authority for pine destruction was requested and obtained from the State Forester. However, by the time authority was obtained,

On October 15, 1927, there was found a canker fruited twice on 1921 year of growth. This was the oldest canker found, and was clearly of older origin than the other cankers found. Also in October, 1927, there were many first symptoms, small circular infections 1/8 to 1/3 inches in diameter, around the bases of needles. These young infections were not visible on August 20, 1927.

Other Inoculations:

Table No. 21

Penetration of Blue, Pycnidia Into Infection
Cankers Caused August 20, 1927.

Other Species Used	Age	No.	Number Inf.	% Leaves Infected	% Leaves Infected for Each Surface Bearing Urediniа Pairs	Average Distance from Pines to Infected Plants
1. Saxifraga	12	7	24	80	80	25 ft. 30 ft.
2. R. laxiflorum	8	8	104	80	80	30 ft. 25 ft.
3. R. laxiflorum	100	100	728	80	70	10 ft. 10 ft.
4. Grasses*	8	8	—	—	—	75 ft. 100 ft.

*Small bunches, not over 10 feet five steps per bush.

Attention is called to the fact that infection on R. laxiflorum on north side of road showed 80% of infected surface bearing uredinia, and 20% bearing telia. This large percentage of uredinial production indicates that infection on the Ribes occurred in the recent rains.

Ribes laxiflorum on this plot occurs in large clumps of bushes averaging about 1 foot in height. It was estimated that 80% of the actual ground space north of the road was occupied by R. laxiflorum, and 30% on the south side of the road.

Summary: Inasmuch as this pine infection is the southernmost known and since no other pine infection was found within 100 miles, it was deemed advisable to destroy all pines on the plot in the hope of reducing the spread of spores affecting Tuolumne and points south. The present owners of the property were written to, asking their permission for the destruction of the pines. The letters were returned undelivered and while authority for pine destruction was requested and obtained from the State Forester. However, by the time authority was obtained,

the season was so far advanced that it was impossible to reach the infected area. Hence the pines have not been destroyed. This work should be done in the spring as soon as it is possible to reach the area.

16. Snohomish County.

Snohomish County was scouted in a general way over the entire county. Pines are chiefly confined to the eastern portion of the county on the west-facing slopes of the Cascades, altho small areas of pines occur in the coast region of the county.

a. Record of scouting performed. Pine infection was found up the South Fork of Stilaguamish River among the plantations of P. monticola and P. strobus set out by the Forest Service. Ribes bracteosum was found in very great profusion along the main river and along tributaries. Near Silverton was an old water flume 3/4 mile in length, situated in the valley bottom in the midst of dense R. bracteosum. Growth averaging 200 feet wide, and often 1000 feet wide for the entire length of the flume. Table No. 31 gives the results of scouting in Snohomish County classified according to association of hosts.

the season was so far advanced that it was impossible to reach the infected area. Hence the plans have not been destroyed. This work should be done in the early as soon as it is possible to reach the area.

16. Snohomish County.

Snohomish County was covered in a general way over the entire county. Fires are chiefly confined to the eastern portion of the county on the west-facing slopes of the Cascades, altho small areas of fires occur in the coast region of the county.

a. Record of scouting performed. Fire infection was found on the South Fork of Skilaguamish River among the plantations of P. monticola and P. strobus set out by the Forest Service. Fires previously was found in very great profusion along the main river and side streams. Near Silverton was an old water flume 3/4 mile in length, situated in the valley bottom in the midst of dense P. ponderosa. Growth averaging 200 feet wide, and often 1000 feet wide for the entire length of the flume. Table No. 31 gives the results of scouting in Snohomish County classified according to association of hosts.

Table No. 31

Analysis of Scouting, Snohomish County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	5	142	0	--	0	0	0	0	?	?
Pines Healthy Ribes	3	3	0	--	R.brac.	35	0	0	) 1'-	
					R.sang.	5	0	0	) 100'	?
					R.lac.	4	0	0	)	
Healthy	3	27	0	--	R.brac.	11	0	0	) 100'-	
					R.sang.	9	0	0	)	?
					R.lac.	7	0	0	) 300'	
	1	10	0	--	R.brac.	13	0	0	) 300'-	
					R.sang.	2	0	0	)	?
					R.lac.	1	0	0	) 500'	
	1	9	0	--	R.brac.	3	0	0	1500'	
Pines Infected Ribes(?) Healthy	1 *	P.s27 P.m25	0 2	1.5	R.brac. R.lac.	None examined			1500' 10'	1500'
Pines Healthy Ribes	1	4	0	--	R.brac.	5	2	1	1200'	?
					R.div.	1	0	0	1200'	
					R.lac.	1	0	0	1300'	
Infected	1	65	0	--	R.brac.	17	5	25	300'	
					R.sang.	3	0		300'	
Pines Infected Ribes Infected	1	110	3	1.3	R.brac.	6	1	1	150'	175'
	1	P.s 104	11	2	R.brac.	8	3	5	50'	50'
No Pines Ribes Healthy	13	0	0	--	R.brac. R.div. R.sang. R.lac.	337 11 30 24	0 0 0 0	0 0 0 0	?	
No Pines Ribes Infected	14	0	0	1.8	R.brac. R.lac.	2795 19	33 0	10.5 —	?	?
Totals	50	P.m 395 11 P.s 131 536	5 11 16	1.8	R.brac. R.div. R.sang. R.lac.	3270 13 49 56	37 1 0 0	11.3	?	?
	Grand Total					3386	37	11.3		

* Pinus strobus
P. monticola

Table No. 61

Malaria of Sending, Southern Czech, examined

Attention is directed to certain points in Table No. 31:

1. There were 13 inspections made in Snohomish County where pines and Ribes were associated. Of this total 5, or 38%, showed one or both hosts infected; 1, or 8%, showed pines infected with Ribes infection not determined; 2, or 15%, showed pines healthy with R. bracteosum infected; and 2, or 15%, showed both hosts infected.

2. There were 32 inspections made where pines were absent and Ribes only were examined. Of this total, 14, or 46% showed R. bracteosum infected.

3. There was no increase in the amount of R. bracteosum infection where pines, either healthy or infected, were associated, over infection of R. bracteosum where pines were absent. This indicates that infection at points scouted in Snohomish County is still in the introductory stage.

b. Details of pine infection. There is given below a detailed description of each pine infection found.

Name: Long Mt. Plantation. Inspection No. 43.
Location: Long Mt. Plantation. 1½ miles up Martin Creek from Silverton Ranger Station, T. 30 N., R. 9 E., Sec. 14.
Inspectors: MacLeod and Putnam, August 7, 1927.
Pine inspection: Inspected 110 P. monticola planted about 1912 on hillside, mixed in with native white pines. 3 trees found infected, 1-1/3 cankers per tree. Cankers showed wide range in year of growth infected and in stage of canker development, as follows:1 juvenile canker, 1923 year of growth; 1 first pycnia, 1923 year of growth; 1 fruiting first time, 1921 year of growth; and 1 fruiting twice on 1918 year of growth.
Ribes inspection: Many R. bracteosum occurred south of the pine infection, along the river 1 mile away. A few R. bracteosum were found within 100 feet of the healthy pines, and 125 to 250 feet from the infected pines. 6 bushes were examined, 1 found infected, 1% of leaves infected per infected bush. The infected surface showed 30% uredinia, and 70% telia.

Name: Buck Creek Plantation No. 1. Inspection No. 46
Location: Approximately 3 miles west of Barlow Pass on Hartford Eastern R. R., T. 30 N., R. 10 E., Sec. 35-36.
Inspectors: MacLeod, Swanson, Putnam, October 2, 1927.
Pine inspection: Planted P. strobus intermingled with P. monticola, native. This plantation was planted 1910, partly burned 1914. In the judgment of the scouts, there were 104 P. strobus inspected and 11 found infected. Table No. 32 shows the details of infected pines.

Attention is directed to certain points in Table No. 83:

1. There were 13 inspections made in Snohomish County where pines and Ribes were associated. Of this total 5, or 38%, showed one or both hosts infected; 1, or 8%, showed pines infected with Ribes infection not determined; 2, or 15%, showed pines healthy with R. bracteosum infected; and 5, or 38%, showed both hosts infected.

2. There were 22 inspections made where pines were absent, and Ribes only were examined. Of this total, 14, or 64% showed R. bracteosum infected.

3. There was no increase in the amount of R. bracteosum infection where pines, either healthy or infected, were associated, over infection of R. bracteosum where pines were absent. This indicates that infection of pines exerted in Snohomish County is still in the initiary stage.

5. Details of Pine Infection. There is given below a detailed description of each pine infection found.

Name: Long Mt. Plantation. Inspection No. 48.
Location: Long Mt. Plantation. 1½ miles up Martin Creek from Silvertip Ranger Station, T. 30 N., R. 9 E., Sec. 14.
Inspectors: Medcalf and Patton, August 2, 1927.
Pine Inspection: Inspected 110 P. monticola planted about 1912 on hillside, mixed in with native white pines. 3 trees found infected, 1-1\3 canker per tree. Cankers showed wide range in year of growth infected and in stage of canker development, as follows: juvenile canker, 1923 year of growth; 1 first pycnia, 1923 year of growth; 1 fruiting first time, 1921 year of growth; and 1 fruiting twice on 1918 year of growth.
Other Inspection: Many R. bracteosum occurred south of the pine infection, along the river 1 mile away. A few R. bracteosum were found within 100 feet of the healthy pines, and 1/8 to 250 feet from the infected pines. 8 bushes were examined, 1 found infected, 1/4 of leaves infected per infected bush. The infected surface showed 30% uredinia, and 70% telia.

Name: Buck Creek Plantation No. 1. Inspection No. 46.
Location: Approximately 8 miles west of Darlow Farm on Marlford Western R. R., T. 30 N., R. 10 E., Sec. 25-36.
Inspectors: Medcalf, Benson, Graham, October 3, 1927.
Pine Inspection: Planted P. monticola. Strobus intermingled with P. monticola. Native. This plantation was planted 1910, partly burned 1914. In the judgment of the scouts, there were 104 P. strobus infected and 11 found infected. Table No. [illegible] gives [illegible] infected pines.

Table No. 32

Individual Pine Infection,
Buck Creek, Snohomish County, Plantation No. 1

Pine No.	Age (yrs)	Height (feet)	Crown Class	No. Branch Cankers	Remarks
1	15	25	Dominant	3	70' from R. bracteosum on Buck Creek
2	20	18	"	3	40' " " " " "
3	15	15	"	1	30' " " " " "
4	15	12	"	2	100' " " " " "
5	16	12	"	2	
6	15	15	"	1	
7	12	10	"	1	Tree not healthy.
8	15	12	"	4	150' to R. bracteosum.
9	15	20	"	1	Branch dead--Scleroderris sp?
10	14	8	"	1	
11	23	15	"	4	Possibly P. monticola?

Canker analysis:

Table No. 33

Analysis of Cankers
Buck Creek, Snohomish County, Plantation No.1

Year of Growth Infected	Number of Cankers					
	First Symptoms	Juvenile	First Pycnia	Pycnial Scars	Produced Aecia 1st Time	Twice
1923		1	5	3		
1922			5	1		
1921			2	3	1	
1920				1		1

It would appear that infection took place largely in 1922, 1923, and possibly 1924.

Ribes inspection: Many R. bracteosum occur in a belt 1 to 2 chains wide along Buck Creek, immediately adjoining the plot. R. bracteosum bushes are abundant along Palmer Creek and the river 1/8 to 1 mile away. An occasional R. lacustre was found associated with pines on slope. There were 8 R. bracteosum examined and 3 found infected, with an average of 5% of leaves infected per infected bush, within 50 feet of healthy and infected pines. The infected surface was entirely devoted to production of telia.

Remarks: The cost of eradicating R. bracteosum in order to protect this area would be prohibitive. This area excellent for study

Table No. 73

Data about the infection.

Bear Creek, Parkman to Prairie, Tioga Co.

Tree No.	Age (yrs)	Height (feet)	Crown Class	Ex. Branche Canker	Remarks
1	15	25	Dominant	5	2'1" at 1. Uninfected on Bear Creek
2	20	18	"	1	10' " " " " "
3	18	18	"	1	20' " " " " "
4	15	12	"	3	10' "
5	16	12	"	2	
6	18	18	"	3	
7	12	10	"	1	Tree not used by.
8	15	15	"	4	130' to R. brassicarum.
9	15	20	"	1	Branch dead--Heterodermia sp?
10	14	8	"	1	
11	24	18	"	4	Possibly P. monticolor.

Canker and rain:

Table No. 74

Weakness of Canker

Bear Creek, Parkman Corner, Tioga Co.

Year of Growth Infected	Years Elapsed Before Fruiting	Fruiting Cycle	Years of Canker Fruit Form	Fruited Again	Lift Time Taken
1922		3	3		
1923		3			
1924		3	3	3	
1925					

It would appear that infection took place largely in 1922, 1923, and possibly 1924.

Other Investigations: Many E. brassicarum occur in a belt 1 to 2 chains wide along Bush Creek, immediately adjoining the plot. R. brassicarum bushes are abundant along Palmer Creek and the river 1/8 to 1 mile away. An occasional R. laevigata was found associated with pines on slope. There were 8 R. brassicarum examined and 3 found infected, with an average of 5½ of leaves infected per infected bush, within 50 feet of healthy and infected pines. The infected surface was entirely devoted to production of teliа.

Remarks: The cost of eradicating R. brassicarum in order to protect this area would be prohibitive. This area excellent for study

of relative susceptibility of P. strobus and P. monticola in the field.

Name: Buck Creek Plantation No. 5. Inspection No. 47
Location: Approximately 2 miles west of Barlow Pass, Snoqualmie National Forest, on Hartford Eastern R. R., T. 30 N., R. 10 E., Sec. 36.

Inspectors: MacLeod, Swanson, Putnam. October 2, 1927.
Pine Inspection: This plantation is made up of P. strobus and P. monticola intermingled, planted in 1910 and partly burned in 1914. There were 27 P. strobus examined, all healthy; 25 P. monticola examined, 2 infected, 1½ cankers per infected tree. Cankers were classified as follows:

1 canker, 1924 year of growth, 1st pycnia.
1 canker, 1922 year of growth, fruited twice.
1 canker, 1921 year of growth, pycnial scars.

Ribes inspection: Owing to darkness, no Ribes were examined. R. lacustre occurred intermingled with pines, and R. bracteosum was found along Palmer Creek, 1/4 to 1/2 mile away.

Remarks: R. bracteosum are too abundant to pay to eradicate to protect pines. This area excellent for a study of relative susceptibility of P. strobus and P. monticola under western field conditions.

17. Thurston County.

Very few pines are known to occur in Thurston County. A very few scattering pines exist in the extreme northwestern part. The only scouting performed was done west of Olympia along the roads to Shelton, and Grays Harbor.

a. Record of scouting performed. Table No. 34 gives the results of scouting.

of relative susceptibility of *P. albicaulis* and *P. monticola* to the disease.

Table No. 34

Analysis of Scouting, Thurston County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
No Pines Ribes Healthy	1	0	0	--	R.brac.	17	0	--		
					R.sang.	6	0	--	?	?
					R.lac.	1	0	--		
No Pines Ribes Infected	1	0	0	--	R.brac.	45	25	20%	?	?
Totals	2	0	0	--	R.brac.	62	25	20%		
					R.sang.	6	0	--	?	?
					R.lac.	1	0	--		
Grand Total						69	25	20%		

The Ribes infection is of interest because in 1924 Goodding and Hornibrook found infection heavy on R. bracteosum. Both in 1924 and this year the scouts made diligent but unsuccessful search for pines at this point. The fact that Ribes infection where pines were absent was found at the same spot in successive years argues that possibly local wind currents were responsible. This infection is located 6½ miles west of Olympia on the Olympic Highway.

18. Whatcom County.

Pines in Whatcom County are quite generally distributed in the eastern two-thirds of the county, east of a line projected south from Sumas. West of this line, pines were found in the general vicinity of Bellingham, and in the hills north of Lake Whatcom.

Much of Whatcom County, where pines occur, is in the Mt. Baker National Forest, and is not easily reached. The county was satisfactorily scouted, where inaccessibility did not prohibit the work. In the eastern portion, the upper Skagit River was scouted by two men over a period of two weeks. During this time it rained continually, making scouting very difficult.

A large amount of infection, both on pines and Ribes was found in the area scouted. Pine infection was found well established in pine stands. Ribes infection was found throughout the county, wherever scouting was performed.

a. Record of scouting performed. Table No. 35 shows the results of scouting classified according to association of hosts:

Table No. 24

Analysis of Result - Thurston County, Washington

Associations of Species	Pine Infection				Ribes Inspection				Distance from Ribes to	
	No. of Location Infection	Number Infected	Percentage Infected	Centers per Infected Area	No. Infected	% Infected	Average Infection	Percentage Infected	Pine	Ribes
No Pines Ribes Present					4 Spec.	17	0	--		
Ribes Present					3 Spec.	8	0	--	?	
Pine Only	1	0	0	--	1 Spec.	1	0	--		
No Pines Ribes Infected	1	0	0	--	1 Spec.	4%	0%	0%	?	?
Totals	2	0	0	--	8 Spec.	23	0	0%	?	?
					6 Spec.	6	0	--		
					1 Spec.	1	0	--		
Grand Total						6	0	0%		

Ribes Inspection

The Ribes infection is of interest because in 1924 Goodding and Northbrook found infection heavy on R. bracteosum. Both in 1924 and this year the scouts made diligent but unsuccessful search for pines at this point. The fact that Ribes infection where pines were absent was found at the same spot in successive years argues that possibly local wind currents were responsible. This infection is located 6½ miles west of Olympia on the Olympic Highway.

12. Whatcom County.

Pines in Whatcom County are quite generally distributed in the eastern two-thirds of the county, east of a line projected south from Sumas. West of this line, pines were found in the general vicinity of Bellingham, and in the hills north of Lake Whatcom.

Much of Whatcom County, where pines occur, is in the Mt. Baker National Forest, and is not easily reached. The county was satisfactorily scouted, where inaccessibility did not prohibit the work. In the eastern portion, the upper Skagit River was scouted by two men over a period of two weeks. During this time it rained continually, making scouting very difficult.

A large amount of infection, both on pines and Ribes was found in the area scouted. Pine infection was found well established in pine stands. Ribes infection was found throughout the county, wherever scouting was performed.

a. Record of scouting performed. Table No. 25 shows the results of scouting classified according to association of hosts:

Table No. 35

Analysis of Scouting, Whatcom County, Washington

Association of hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No Ribes	2	31	0	--	None	-	-	-	?	?
Pines Infected No Ribes	1	70	70	1	None	-	-	-	?	?
Pines Healthy Ribes Healthy	7	651	0	--	R. brac.	33	0	-	1'-100'	?
					G. div.	22	0	-		
					R. sang.	102	0	-		
					R. visc.	17	0	-		
					R. lac.	54	0	-		
Pines Infected Ribes Healthy	1	150	17	3.3	G. div.	5	0	-	100'	¼ to ½ mi.
					R. sang.	15	0	-		
					R. lax.	3	0	-		
					R. lac.	11	0	-		
Pines Healthy Ribes Infected	2	38	0	--	R. brac.	25	9	2%	400'	?
					R. sang.	21	0	-	100'	
					G. div.	5	0	-	100'	
					R. lac.	10	0	-	100'	
Pines Infected Ribes Infected	1 *	293	13	1.2	R. brac.	3	2	13%	300'	300'
					R. sang.	6	4	22%	8-300'	20-300
					G. div.	3	2	50%	300'	300'
	1	168	10	1.1	R. brac.	8	8	19%	300'	300'
					G. div.	1	1	1%	300'	300'
	1	51	4	1.2	R. sang.	1	1	10%	10'	100'
	1	6	2	4.	R. brac.	157	7	1%	400'	600'
	1	1	1	51.	R. sang.	1	1	95%	?	15'
					R. lac.	4	3	11%	?	15'
	1	35	2	3	G. div.	11	11	100%	300'	300'
					R. sang.	2	0	-	75'	600'
	1	179	31	4	R. sang.	4	4	30%	450'	450'
					R. lac.	1	0	-	1000'	1000'
	1	30	1	1	R. sang.	1	1	10%	30'	150'
	1	10	1	1	R. sang.	1	1	10%	200'	150'
	1	7	4	15.	R. brac.	1	1	10%	200'	200'
					G. div.	7	1	1%	100'	100'
					R. lac.	13	0	-	100'	100'
Total	10	770	56	4.2	R. brac.	170	19	11%	200-400	200-600
					R. sang.	16	12	30%	8-200	15-450
					G. div.	32	15	90%	100-300	100-300
					R. lac.	17	3	11%	100-1000	15-100
					Total	235	49	37%		

Table No. 32

Analysis of Density, Shadow Count, Individuality

Table No. 35 (continued)

No Pines Ribes Healthy	1	0	0	-	R. brac.	9	0	-		
No Pines Ribes Infected	16	0	0	-	R. brac.	400	48	18%	?	?
					R. sang.	14	2	.5		
					R. div.	2	0	--		
					R. lac.	8	0	--		
Total	40	1770	145	6.	R. brac.	671	76	14%		
					R. sang.	175	14	23%		
					C. div.	56	15	80%		
					R. lax.	3	0	--		
					R. visc.	17	0	--		
					R. lac.	100	8	11%		
	Grand Total					1020	103	24.5%		

* This inspection is one made up of Inspections Nos. 2 to 11, inclusive. The combination was made, because such inspections were all made in the Kendall region, an area some 6 miles long by 1 to 2 miles wide, supporting a pine stand of the same age and growing under the same conditions.

Table No. 2E (continued)

No Plants Mines Identified	I	O	C	-	T.bruc.	+	O	-	+	I
No Plants Mines Identified	14	O	C	-	T.bruc. T.alop. T.div. T.lac.	44 11 4 1	44 0 0 0	18 - - -	+	I
Total	4C	1210	140	C.	T.bruc. T.sem. T.div. T.lx. T.vim. T.lac.	871 170 80 3 17 140	75 14 14 1 0 0	18 - - - - -		
Grand Total						1080	108	24.8		

* This insertion is one made up of Inspections Nos. 8 to 11, inclusive. The qualifying ore made, because such inspections make all mode in the Tonkil region, and both zone & mines lying by 1 to 2 miles wide, supporting a pine still of the same age and growing under the same conditions.

Attention is called to certain points in Table No. 35:

1. Infection in Whatcom County is abundant and well distributed on both hosts. Out of 40 inspections made, 30, or 75%, showed either one or both hosts infected.

2. There were 3 inspections made where pines only were found. Of this total, 1 or 33% showed pine infection. At this particular point, inspection was not complete, but nevertheless conditions found indicate that Ribes were scarce.

3. There were 20 inspections made where both hosts were associated. Of this total 13 or 65% showed either one or both hosts infected; 1, or 5% showed pines infected with Ribes healthy; 2, or 10% showed pines healthy with Ribes infected; and 10, or 50% showed both hosts infected. These figures indicate that infection was well established on pines and had reached the stage of intensification, at least in 50% of the points where both hosts were associated.

4. There were 17 inspections made where pines were absent and only Ribes were inspected. Of this total, 16, or 94% showed Ribes infected. This is evidence of the widespread abundance of the rust on Ribes.

Infection conditions on the Ribes species in the different associations of hosts can well be shown in Table No. 36 derived from Table No. 35:

Attention is called to certain points in Table No. 35:

1. Infection in Whatcom County is abundant and well distributed on both hosts. Out of 40 inspections made, 30, or 75%, showed either one or both hosts infected.

2. There were 3 inspections made where pines only were found. Of this total, 1 or 33% showed pine infection. At this particular point, inspection was not complete, but nevertheless conditions found indicate that Ribes were scarce.

3. There were 20 inspections made where both hosts were associated. Of this total 13 or 65% showed either one or both hosts infected; 1, or 5% showed pines infected with Ribes healthy; 2, or 10% showed pines healthy with Ribes infected; and 10, or 50% showed both hosts infected. These figures indicate that infection was well established on pines and had reached the stage of intensification, at least in 50% of the points where both hosts were associated.

4. There were 17 inspections made where pines were absent and only Ribes were inspected. Of this total, 15, or 94% showed Ribes infected. This is evidence of the widespread abundance of the rust on Ribes.

Infection conditions on the Ribes species in the different associations of hosts can well be shown in Table No. 36 derived from Table No. 35:

Table No. 36

Ribes Infection Classified by Association of Hosts

Whatcom County

Association of Hosts	No. of Inspec-tion Points	Ribes Species	Ribes Infection: Number Exam.	Number Inf.	Per cent Bushes Inf.	% Leaves Infected per Infec-ted Bush	% Leaves Infected per Bush Examined
Pines Healthy		R.brac.	29	9	31%	2%	.6%
		R.sang	26	0	--	--	--
Ribes Infected	2	G.div.	5	0	--	--	--
		R.lac.	10	0	--	--	--
		Total	70	9	13%	2%	.3%
Pines Infected		R.brac	170	19	11%	11%	1.2%
		R.sang	16	12	75%	30%	22.5%
Ribes Infected		G.div.	22	15	68%	80%	54.5%
		R.lac.	17	3	18%	11%	2.0%
	10	Total	235	49	21.8%	36.8%	8.0%
No Pines		R.brac	400	48	12%	18%	2.2%
		R.sang	14	2	14%	.8%	.07%
Ribes Infected		G.div.	2	0	--	--	--
		R.lac.	8	0	--	--	--
	16	Total	424	50	11.8%	17.3%	2.0%

It is evident from an examination of Table No. 36 that the per cent of bushes infected and the per cent of leaves infected was greatest where infected Ribes were associated with infected pines.

In the case of association of infected pines with infected Ribes, all 4 Ribes species were found infected; while where pines were healthy, only R. bracteosum was infected; and where pines were absent only R. bracteosum and R. sanguineum showed infection.

The facts that all species of Ribes associated with infected pines were found infected, and that infection of Ribes was greatest when associated with infected pines, are evidence that intensification of Ribes infection had taken place, caused by aecial production from nearby infected pines.

It may be noted that infection on R. bracteosum associated with infected pines is the lightest of the four species of Ribes. While this is an apparent contradiction to the generally accepted belief that R. bracteosum has the highest relative susceptibility of wild

Table No. 36

Ribes Infection Classified by Association of Hosts
Western Canada

Association of Hosts	No. of Infection Points	Ribes Species	Number Exam.	Number Inf.	Per cent Bushes Inf.	% Leaves Infected per Inf. Bush	% Leaves Infected per Bush Examined
Pines Healthy		R. prae.	30	3	10%	2%	.2%
		R. cong.	26	0	--	--	--
		R. liv.	9	0	--	--	--
Ribes Infected	2	R. lac.	10	0	--	--	--
		Total	70	3	4%	2%	.1%
Pines Infected		R. prae.	173	10	11%	11%	1.2%
		R. cong.	75	12	72%	32%	23.0%
Ribes Infected		R. liv.	32	15	88%	80%	84.8%
		R. lac.	17	3	18%	11%	2.0%
	10	Total	298	40	13.4%	34.2%	5.0%
No Pines		R. prae.	400	43	11%	10%	2.1%
Ribes Infected		R. cong.	14	2	14%	.6%	.07%
		R. liv.	2	0	--	--	--
		R. lac.	8	0	--	--	--
	16	Total	424	45	11.0%	17.0%	2.0%

It is evident from an examination of Table No. 36 that the per cent of bushes infected and the per cent of leaves infected was greatest where infected Ribes were associated with infected pines.

In the case of association of infected pines with infected Ribes, all 4 Ribes species were found infected; while where pines were healthy, only R. praetosum was infected; and where pines were absent only R. praetosum and R. sanguineum showed infection.

The facts that all species of Ribes associated with infected pines were found infected, and that infection of Ribes was greatest when associated with infected pines, are evidence that intensification of Ribes infection had taken place, caused by aecial production from nearby infected pines.

It may be noted that infection on R. praetosum associated with infected pines is the lightest of the four species of Ribes. While this is an apparent contradiction to the generally accepted belief that R. praetosum has the highest relative susceptibility of wild

Ribes on the coast, it may be explained by stating that R. bracteosum in these associations was farther away from infected pines than were the other Ribes species and thus less subject to infection from local aecial sources.

b. Details of pine infection. Certain of the pine infections are described in detail below:

Name: Kendall Area. Inspection Nos. 2 - 11 inclusive.
Location: An area 6 miles long, and 1 to 2 miles wide located between Kendall and Sumas, Whatcom County, T. 40 N., R. 5 E., Secs. 15, 22, 23, 27, 28.
Inspectors: Putnam, MacLeod, Edmunds, August 9,10, 1927.
Pine Inspection: This area supports a growth of pines 11 to 20 years old, scattered and in bunches throughout the area. There were 293 P. monticola examined, 12 found infected, 1.2 cankers per infected tree.
Canker analysis:

Table No. 37

Analysis of Cankers, Kendall Area, Whatcom County

Year of Growth Infected	Number of Cankers						
	First Symptoms	Juvenile	First Pycnia	Pycnial Scars	Produced Aecia		
					1st time	Twice	Several Times
1924		1			1		
1923					3	2	
1922					2		
1921					1	2	1
1920					1		

Apparently infection occurred chiefly in 1924.

Ribes inspection: Ribes species are very scarce in this region. There is a large flowing spring in the approximate center of the area, around which stream are G. divaricata, R. lacustre in abundance, and R. bracteosum in less degree of abundance. No increased amount of pine infection was evident near these Ribes concentrations. R. sanguineum was found very sparsely over the area. At no place was any concentration of pine infection noticeable.

Table No. 38 shows the results of Ribes inspection on this area:

Ribes on the coast, it may be explained by stating that R. bracteosum in these associations was further away from infected pines than were the other Ribes species and thus less subject to infection from local seral sources.

b. Details of pine infection. Certain of the pine infections are described in detail below:

Area: Woodfill area. Inspection Nos. 2 - 11 inclusive.
Location: An area 6 miles long, and 1 to 2 miles wide located between Woodfill and Zena, Whatcom County, T. 40 N., R. 5 E., Secs. 12, 20, 21, 27, 28.
Inspectors: Tolman, Macleod, Edmund, August 9,10, 1927.
Pine Infection: This area supports a growth of pines 11 to 20 years old, scattered and in bunches throughout the area. There were 282 P. monticola examined, 12 found infected, 1.8 minors per infected tree.

Center analysis:

Table No. 27

Analysis of Centers, Woodfill Area, Whatcom County

Year of Growth Infected	Number of Centers						
	First Evection	Parasitic Dwarfle	First Lycopl Fruit	Lycopl Every	Infected Needle 1st Time	Infected Needle Twice	Infected Needle Several Times
1924		1			1		
1923					3	3	
1922					2		
1921					1	2	1
1920					1		

Apparently infection occurred chiefly in 1924.

Ribes Inspection: Ribes species are very scarce in this region. There is a large flooding in the approximate center of the area, around which stream are R. divaricata, R. lacustre in abundance, and R. bracteosum in less degree of abundance. No increased amount of pine infection was evident near these Ribes concentrations. R. sanguineum was found very sparsely over the area. At no place was any concentration of pine infection noticeable.

Table No. 28 shows the results of Ribes inspection on this area:

Table No. 38

Inspection of Ribes, Kendall Area
Whatcom County.

Ribes Species	Number Exam.	Number Inf.	% Leaves Infected per Inf. Bush	% Infected Surface Bearing Uredinia	% Infected Surface Bearing Telia	Average Distance from Ribes to Healthy Pines	Average Distance from Ribes to Infected Pines
R.brac.	3	2	13%	65	35	300 ft.	300 ft.
G.div.	3	2	50%	20	80	" "	" "
R.sang.	6	4	22%	40	60	[illegible] ft.	20-300'

The fact that a large percentage of infected surface of infected R. bracteosum and R. sanguineum was devoted to uredinial production indicates that uredinial intensification was in progress on these bushes, and that infection reached these bushes later in the season than it did G. divaricata.

Remarks: It was in this general area that R. nigrum was found and destroyed on the International Cement Company property, in April, 1922. A very thorough examination of the abundant pine growth immediately surrounding these R. nigrum bushes was made in 1922, 1924, and in 1927, but at no time were any of these pines found infected.

In April, 1924, Putnam found 2 pines infected out of 200 examined, at a point in the region, but about 3 miles from the previous location of R. nigrum.

On April 3, 1927, Goodding and Putnam found scattering pine infection in this area. This area offers an excellent opportunity for extensive study to determine the relationship of the few Ribes and pine infection. Possibly information of value could be obtained relative to the distance spores can travel from Ribes to pines and cause pine infection.

Name: Glacier Infection. Inspection No. 35.
Location: 1 mile west of Glacier, Whatcom County, Washington, on south side of road, T. 39 N., R. 6 E., Section 1.
Inspectors: MacLeod and Edmunds, August 18, 1927.
Pine inspection: One solitary pine, 15 years old, 25 feet tall, infected, 31 cankers found. Tree growing close to small stream which supports R. lacustre and R. sanguineum.
Canker analysis:

Table No. 39

Analysis of Cankers, Glacier Plot
Whatcom County.

Year of Growth Infected	Number of Cankers							
	First Symptoms	Juvenile	First Pycnia	Pycnial Years	Produced Aecia			
					1st Time	Twice	Several Times	Canker end
1924	5	6	11		3			
1923		2	1	1	5			
1922					2	5	1	1
1921					1	3	1	2
1920					3		1	

While the cankers found do not arrange themselves to show very definitely the waves of infection, nevertheless evidence is suggestive of a wave of infection in 1923 and another in 1925.

Ribes inspection: Ribes lacustre and R. sanguineum were found from 10 to 20 feet from the infected pine. Table No. 40 shows the results of Ribes inspection at this inspection point. Individual Ribes species infection is given for the purpose of showing the range in the degree of infection.

Table No. 40

Ribes Inspection Glacier Plot, Whatcom County

Ribes Species	Number		% Leaves Infected per Inf. Bush	Per cent Infected Surface Bearing			Distance from Ribes to	
	Examined	Inf.		Uredinia	Telia	Necrotic Areas	Healthy Pines	Infected Pines
R.lac.	3	1	25%	---	25	75	?	10-20 ft
R.lac.	1	1	10%	10	70	20	?	10 ft.
R.lac.	1	1	.1%	---	100	---	?	15 ft.
R.sang.	1	1	85%	10	60	40	?	15 ft.

On August 18, 1927, uredinial intensification of the rust on Ribes found here had nearly ceased. A large amount of the infected surface was dead.

Remarks: This infection was first found by Goodding and Putnam in April, 1927. At that time 12 cankers were found on one whorl, 2 feet above ground. This infection is an excellent one to keep under observation in future years.

Name: Upper Skagit Infection. Inspection No. 38.
Location: Upper Skagit River country. Near International Boundary on Hope trail, Whatcom County, T. 40 N., R. 13 E., Sec. 3.

Form No. 32

Analysis of Survey, Detail Plat
Uniform County

Type of Parcels Surveyed	Number of Parcels						
	First Inspection	Streets Inspected	Alleys Inspected	Plat Approved	Improved Lots Having Water	Improved Lots Having Sewer	Center Lots
Plat A	4	4					
Plat B	3	3	1	2			
Plat C				1	0	1	1
Plat D					2	2	2
Plat E				2	1	1	

While the owners found no cost attached themselves to show very definitely the waves of infection, nevertheless evidence is strongly of a wave of infection in 1923 and another in 1928.

Bibes Inspection: Bibes leucotxe and B. sanguineum were found from 10 to 30 feet from the infected pine. Table No. 40 shows the results of Bibes Inspection at this inspection point. Individual Bibes species infection is given for the purpose of showing the range in the degree of infection.

Table No. 40

Bibes Infection Survey (1st. Inspection)

Bibes Species	Number Tested	Number Infected	Percent Infected	Leaves for most Infected Surface Bearing Uredinia Telia	Nearness from Bibes to Nearest Pine Infected	Nearest Healthy Pines
B. leu.	3	1	33⅓	25	75	10-30 ft.
B. san.	1	1	10	10	10	10 ft.
B. ind.	1	1	1	---	---	15 ft.
Totals	1	1	10%	1%	40	15 ft.

On August 15, 1927, uredinial internal infection of the rust on Bibes found here had nearly ceased. A large amount of the infected surface was dead.

Remarks: This infection was first found by Spaulding and Bibes in April, 1920. At that time 12 centers were found on one acre, 4 feet above ground. This infection is an excellent one to keep under observation in future years.

Name: Upper Skagit Infection. Inspection No. 38.
Location: Upper Skagit River country. Near International Boundary on Hope trail, Whatcom County, T. 40 N., R. 13 E., Sec. 3.

Inspectors: Edmunds and Robertson, August 27, 1927.
Pine inspection: Pines scattered and in clumps, all ages up to mature. Pines very slow in growth. Examined 150 P. monticola 17 found infected, average of 3 cankers per infected tree. Infection apparently of old standing. 1 canker found on 1913 year of growth, 2 on 1916 wood, 1 on 1918 wood, 2 on 1919 wood.
Ribes inspection: Ribes species scattered along trail. There were 15 R. sanguineum; 11 R. lacustre; 3 R. laxiflorum, and 5 G. divaricata inspected and none found infected. These bushes were from 1/8 to 1/2 mile from infected pines.
Remarks: This area has not been examined by anyone except the scouts. It should be scouted more intensively. There is a good opportunity for the study of the effect on pines of infection on R. lacustre at different distances.

Name: Thunder Lake Infection. Inspection No. 47
Location: North and west side of Thunder Lake, upper Skagit River country, Whatcom County, T. 37 N., R. 13 E., Sec. 10.
Inspector: Robertson, September 5, 1927.
Pine inspection: P. monticola abundant. 21-30 year age class. 70 examined, 70 reported infected. No details of infection were given but statement was made that infection was in all stages of canker development.
Ribes inspection: None found.
Remarks: This area needs further scouting. No one but the two scouts has seen any of the infections in the upper Skagit River region. During the two weeks of scouting this country on foot, it rained nearly continuously.. Reports of scouting in this region, while excusably incomplete, indicate a heavy and widespread infection of pines which has been in the region a long time, possibly since 1915 or 1916. This whole region should be well scouted in 1928.

C. Inspection of Forest Service Pine Plantations.

A record of all Forest Service white pine plantations inspected has been made in this report, in the report of scouting performed in the county concerned. For convenience all inspections of Forest Service plantations are discussed together here.

I. Inspection of Plantations.

Table No. 41 gives the results of inspection of certain white pine plantations planted by the Forest Service.

Inspectors: Edwards and Robertson, August 27, 1927.

Pine Inspection: Pines scattered and in clumps, all ages up to mature. Pines very slow in growth. Examined 150 P. monticola 17 found infected, average of 1 canker per infected tree. Infection apparently of old standing. 1 canker found on 1913 year of growth, 2 on 1916 wood, 1 on 1918 wood, 2 on 1919 wood.

Other Inspection: Mixed species scattered along trail. Pines were 15 P. ponderosa; 11 P. Jeffreyi; 8 P. Lambertiana, and 5 P. divaricata inspected and none found infected. These trees were from 1/3 to 1/2 mile from infected pines.

Remarks: This area has not been examined by anyone except the writer. It should be scouted more intensively. There is a good opportunity for the study of the effect on pines of infection on P. Jeffreyi at different distances.

Name: Thunder Lake Infection. Inspection No. 47

Location: North and west side of Thunder Lake, upper Kneeh River country, Shasta County, T. 37 N., R. 12 W., Sec. 10.

Inspector: Robertson, September 5, 1927.

Pine Infection: P. monticola abundant. 81-80 year age class. 70 examined, 70 reported infected. No details of infection were given but statement was made that infection was in all stages of canker development.

Ribes Inspection: None found.

Remarks: This area needs further scouting. No one but the two scouts has seen any of the infections in the upper Kneeh River region. During the two weeks of scouting this country on foot, it rained nearly continuously. Reports of scouting in this region, while exceedingly incomplete, indicate a heavy and widespread infection of pines which has been in the region a long time, possibly since 1913 or 1916. This whole region should be well scouted in 1928.

I. Inspection of Forest Service Pine Plantations.

A record of all Forest Service white pine plantations inspected has been made in this report, in the report of scouting performed in the county concerned. For convenience all inspections of Forest Service plantations are discussed together here.

Table No. 41 gives the results of inspection of certain white pine plantations planted by the Forest Service.

Table No. 41

Record of Inspections of Forest Service White Pine Plantations, Western Washington, Summer, 1927.

National Forest	Name of Plantation	Date Inspected	Pine Inspection			Ribes Inspection			Remarks:
			Species	Number examined	Number infected	Species	Number examined	Number infected	
Wind River Branch N.W. Forest Exp. Station	Arboretum	Sept. 9 1927	P.stro. P.mont. P.lamb.	10 20 2	0 0 0	None			R. bracteosum or wild black currant occurs in moderate amounts about 400 feet south of pines in Arboretum. Both pines and Ribes were found infected near Spirit Lake, approximately 38 miles air line north west of the Arboretum.
Snoqualmie National Forest	Long Mt.	Aug. 7 1927	P.mont.	110	3	R.brac.	6	1	R. bracteosum or wild black currant abundant along river 1 mile south of plantation, and scattering along Martin Creek, 1/8 mile west of plantation. Infection on wild black currant found in small amounts along river. To eradicate wild black currant within infecting distance to pine plantation would be very expensive.
Snoqualmie National Forest	Buck Creek No. 1	Oct. 3 1927	P.stro.	104	11	R.brac.	8	3	Insufficient time was allowed for an inspection of these plots. Plots numbered 2,3,4,6 and 12 were not inspected. All of these plots had been partially or completely burned. R. bracteosum or wild black currant is very abundant near these plots on Palmer Creek, Buck Creek and other smaller tributary creeks. To properly protect the pine plantations from blister rust would necessitate a large outlay of money to eradicate the wild black currants.
	Buck Creek No. 5	Oct. 3 1927	P.stro. P.mont.	37 25	0 2	None examined owing to darkness			

Form No. 2

Report of Inspection of Land Affected by Strip Mining

State Mine Inspector, Ohio, 19[illegible]

Name:

2. Infection Conditions Around Plantations not Inspected. While no forest Service white pine plantations were inspected other than those shown in Table No. 41, it is well to mention known infection conditions surrounding plantations not inspected.

Granite Mt. Area. The known infection nearest to this area was found about 2 miles north of North Bend, where R. bracteosum, or wild black currant was found infected, about 15 miles west of the plantations.

Scenic Area. T. 26 N., R. 13 E., Section 20, King County. The region surrounding this area was not scouted.

Soleduck Areas. T. 30 N., R. 10 W., Secs. 19 and 20; T. 30 N. R. 11 W., Section 24. Olympic National Forest. Infection has been found on pines along Soleduck river within 1 to 3 miles of the pine plantations. That blister rust is abundant in the vicinity is evidenced by the fact that pine infection was found at Beaver, Fairholm, Moores Camp Grounds, and Pysht, all points within a radius of 12 miles. At several other points within this radius Ribes infection was found. It is highly probable that infection is now present in the plantations.

No scouting was done in the vicinity of the White Pine Creek plantations on the Wenatchee National Forest, so blister rust conditions in that region are not known.

VI. Costs of Scouting, Western Washington, 1927

The costs of scouting in western Washington shown in Table No. 42 are those incurred in the spring scouting from March 30 to April 6, 1927 inclusive; and in the summer scouting performed from July 22, 1927 to September 15, 1927. It does not include costs of the following items: (1) Inspection of Forest Service Plantations at Buck Creek, on October 2, 1927, while enroute to Cheekye, B. C.; (2) reinspection of infection points by Detwiler and Putnam in the middle of October, 1927, and (3) a similar trip made by Posey and Putnam to Bremerton in early December, 1927. The costs of these trips are not included in Table No. 42, because such trips were not made for the purpose of scouting for the disease but for the purpose of determining the value of infection points as study areas.

3. Inspection [illegible] not inspected. Units
re Forest Service units [illegible] inspections were inspected other than
those noted in Table No. 41, it is safe to mention known infection
conditions surrounding plantations not inspected.

Creole Mts. Area. The known infection nearest to this area
was found about 4 miles north of North Bend, where R. bracteosum, or
vine blight current was found infected, about 15 miles west of the
plantations.

Kwale Area. T. 22 S., R. 14 W., Section 24, Siuslaw N.
The region surrounding this area was not scouted.

Salmon Area. T. 30 N., R. 10 W., Secs. 19 and 20; T. 30 N.
R. 11 W., Section 24, Olympic National Forest. Infection has been
found on pines along Soleduck River within 1 to 3 miles of the pine
plantations. That blister rust is abundant in the vicinity is evidenced
by the fact that vine infection was found at Beaver, Fairholm, Moores,
Cine Grounds, and Tyeth, all points within a radius of 12 miles. At
several other places within this radius Ribes infection was found. It
is highly probable that infection is now present in the plantations.

No scouting was done in the vicinity of the White Pine Creek
plantations on the Wenatchee National Forest, so blister rust condi-
tions in that region are not known.

VI. Costs of Scouting, Winter Scouting, 1927

The costs of scouting in western Washington shown in Table
No. 42 are those incurred in the spring scouting from March 30 to
April 6, 1927 inclusive; and in the summer scouting performed from
July 27, 1927 to September 15, 1927. It does not include costs of
the following items: (1) Inspection of Forest Service plantations at
Rock Creek, on October 2, 1927, while enroute to Cheoyke, B. C.;
(2) reinspection of infection points by Detwiler and Putnam in the
middle of October, 1927, and (3) a similar trip made by Posey and
Putnam to Forks in early December, 1927. The costs of these
trips are not included in Table No. 42, because each trip were not
made for the purpose of scouting for the disease but for the purpose
of determining the value of infection points as study areas.

Table No. 42

Costs of Scouting for Blister Rust, Western Washington.

Period 1927	Total Man Days	Salaries	Subsis-tence	Transportation Personal auto @ 7¢	Transportation Other	Equip-ment	Miscel-laneous	Grand Total
Mar. 30-April 6	16	$ 110.83	$ 54.35	$ 71.54	$12.28			$ 249.00
July 22-Sept. 15	321	1,358.16	902.75	743.68	55.85	$94.05	$11.10	3,165.59
Total	337	$1,468.99	$957.10	$815.22	$68.13	$94.05	$11.10	$3,414.59

In the "Transportation Other" column is an item of $42.50 as a packing charge for a trip made into the Olympics on August 27 to 31, 1927.

The equipment charge of $94.05 represents the entire office equipment depreciation prorated to this project.

Miscellaneous costs are those for telegrams, telephone calls, colored crayons, etc.

It may be observed in Table No. 42 that the expenditure for salaries represents approximately 43% of the total cost. The difference or 57% is that chargeable to general field expenses. The field expenses were high largely because of the great amount of travel, chiefly by personally owned automobiles, operated at $.07 per mile. In order to cover the large territory assigned, this expense of travel was necessary.

The subsistence cost amounted to $2.84 per man day, which is not excessive, when it is considered that for the most part the scouts ate their meals at restaurants and stayed at hotels. Camping out for the sole purpose of saving on expense was discouraged, because it was deemed a better use of time to scout until dark, rather than to use daylight for making and breaking camp. A certain amount of camping out was done where conditions were such that a loss of time and increased cost would have resulted if scouts went out of their way to find lodgings and meals.

The cost of scouting per man day amounted to:

$$\frac{\$3,414.59}{337} = \$10.13.$$

This figure is believed to represent a good average figure for the cost of scouting. It was higher than the cost per man day of most of the other projects, chiefly for three reasons: (1) The average salary paid scouts was higher than on many of the projects because of the

Table No. 40

Cost of Trouble for Platter Bus
Carrying and Lodging

Period 1927	Man Days	Salaries	Subsis-tence	Transportation Auto & Tk.	Other	Equip-ment	Miscel-laneous	Grand Total
Mar. 3- April 8	16	$ 110.72	$ 24.32	$ 71.64	$17.43			$ 243.00
May 28- Sept. 10	201	1,788.14	572.16	744.48	52.85	$96.05	$11.10	3,165.59
Total	217	$1,898.86	$596.48	$816.12	$70.28	$96.05	$11.10	$3,408.59

In the "Transportation Other" column is an item of $52.80 as a packing charge for a trip made into the Olympics on August 27 to 31, 1927.

The equipment charge of $96.05 represents the entire office equipment depreciation prorated to this project.

Miscellaneous costs are those for telegrams, telephone calls, colored crayons, etc.

It may be observed in Table No. 42 that the expenditure for salaries represents approximately 43% of the total cost. The difference or 57% is that chargeable to general field expenses. The field expenses were high largely because of the great amount of travel, chiefly by personally owned automobiles, operated at $.07 per mile. In order to cover the large territory assigned, this expense of travel was necessary.

The subsistence cost amounted to $2.84 per man day, which is not excessive, when it is considered that for the most part the scouts ate their meals at restaurants and stayed at hotels. Camping out for the sole purpose of saving on expense was discouraged, because it was deemed a better use of time to scout until dark, rather than to use day light for making and breaking camp. A certain amount of camping out was done where conditions were such that a loss of time and increased cost would have resulted if scouts went out of their way to find lodgings and meals.

The cost of scouting per man day amounted to:

$$\frac{\$3,414.59}{337} = \$10.13.$$

This figure is believed to represent a good average figure for the cost of scouting. It was higher than the cost per man day of most of the other projects, chiefly for three reasons: (1) The average salary paid scouts was higher than on many of the projects because of the

desirability of using experienced men who were capable of work on their own initiative and responsibility. This year the average salary paid scouts amounted to approximately $130.80 per month, or $4.36 per day. (2) The cost of subsistence was high because of the desirability of utilizing all daylight for scouting rather than for making camp, except when necessary. (3) Scouting necessitated a great deal of travel in order to cover the territory scouted.

VII. Summary and Conclusions.

A. Summary of Scouting, Summer, 1927.

The results of the spring scouting trip are not summarized here because the same area was scouted in the summer, and also because Ribes infection had not developed in early April, and hence the findings in the spring were not directly comparable to the results of the summer scouting.

Scouting in the summer was carried on from July 22 to September 15, 1927. During August, when the bulk of the work was done, there were 4 two-man parties in the field, each party equipped with a personally owned automobile.

The territory assigned to be scouted included both slopes of the Cascades for their entire length in Washington, and the Olympic Peninsula south to the Columbia River. Owing to the fact that scouting on the coast was brought to a close in early September, in order to scout in the Inland Empire, the entire region assigned was not covered. Southwestern Washington, south of Grays Harbor region was not scouted, and practically no scouting was performed east of the summit of the Cascades.

The results of scouting are summarized below according to the three purposes as stated in the introduction, namely:

1. Extent of blister rust on the coast.
2. Selection of study areas.
3. Location of white pine areas.

1. Extent of blister rust on the coast. The results of scouting are summarized below on two bases as follows:

(a) Associations of hosts.
(b) Counties.

a. Results of scouting classified by association of hosts.

Table No. 43 gives the results of scouting in western Washington, Summer, 1927, classified according to association of hosts.

desirability of using experienced men who were capable of work on their own initiative and responsibility. This year the average salary paid scouts amounted to approximately $130.80 per month, or $4.36 per day. (2) The cost of subsistence was high because of the desirability of utilizing all daylight for scouting rather than for making camp, except when necessary. (3) Scouting necessitated a great deal of travel in order to cover the territory scouted.

VII. Summary and Conclusions.

1. Summary of Results in Tables I to VI.

The results of the spring scouting trip are not summarized here because the same area was scouted in the summer, and also because Ribes infection had not developed in early April; and hence the findings in the spring were not directly comparable to the results of the summer scouting.

Scouting in the summer was carried on from July 22 to September 15, 1927. During August, when the bulk of the work was done, there were 4 two-man parties in the field. Each party equipped with a personally owned automobile.

The territory assigned to be scouted included both slopes of the Cascades for their entire length in Washington, and the Olympic Peninsula south to the Columbia River. Owing to the fact that scouting on the coast was brought to a close in early September, in order to scout in the Inland Empire, the entire region assigned was not scouted. Southwestern Washington, south of Grays Harbor region was not scouted, and practically no scouting was performed east of the summit of the Cascades.

The results of scouting are summarized below according to the three purposes as stated in the introduction, namely:

1. Extent of blister rust on the coast.
2. Selection of study areas.
3. Location of white pine areas.

1. Extent of blister rust on the coast. The results of scouting are summarized below on two bases as follows:

(a) Associations of hosts.
(b) Counties.

a. Results of scouting classified by Association of hosts.

Table No. 46 gives the result of scouting in western Washington, Summer 1927, classified according to Association of hosts.[1] The

Table No. 43 (continue)

Total Scouting Performed, Western Washington, Classified According to Association of Hosts, Summer 1927.

Association of Hosts	No. of Inspection Points	Pine Inspection Species	Pine Inspection Number Examined	Pine Inspection Number Infected	Pine Inspection Carriers per Infected Tree	Ribes Inspection Species	Ribes Inspection Number Examined	Ribes Inspection Number Infected	Ribes Inspection % Leaves Infected per Infected Bush
Pines Healthy No Ribes	79	P. mont.	2571	0	--		-	-	-
		P. lamb.	2	0	--	None	-	-	-
		P. stro.	10	0	--				
		Total	2583	0	--				
Pines Infected No Ribes	2	P. mont.	100	72	1	None			
Pines Healthy Ribes Healthy	85	P. mont.	4501	0	--	R.brac.	1558	0	-
		P. albi	80	0	--	R.sang.	243	0	-
						G.div.	82	0	-
						R.lax.	175	0	-
						R.acer.	35	0	-
						G.lobbi.	89	0	-
						R.visc.	83	0	-
						R.lac.	236	0	-
		Total	4581	0	--	Total	3490	0	-
Pines Infected Ribes Healthy	12	P. mont.	924	39	2.3	R.brac.	25	0	-
		P. stro.	27	0	--	R.sang.	36	0	-
						G.div.	10	0	-
						R.lax.	9	0	-
						G.lobbi.	6	0	-
						R.lac.	11	0	-
						G. R. C.	2	0	-
		Total	951	39	2.3	Total	97	0	-
Pines Healthy Ribes Infected	18	P. mont.	1378	0	--	R.brac.	322	57	10
						R.sang.	81	4	1
						G.div.	150	6	27
						G.lobbi.	15	1	Trace
						R.lac.	77	0	--
		Total	1378	0		Total	645	68	11
Pines Infected Ribes Infected	27	P. mont.	1408	204	10.2	R. nig.	12	12	80
		P. stro.	113	14	1.2	R.brac.	330	60	21
						R.sang.	31	23	37
						G.div.	26	15	80
						R.lax.	103	103	40
						R.lac.	37	14	7
						G. R. C.	17	2	Trace
		Total	1521	218	9.7	Total	555	223	38

Table No. 42

Table No. 43 (continued)

No Pines Ribes Healthy	153	Zone	0	0	--	R. nig.	25	0	--
						R. brac.	4994	0	--
						R. sang.	137	0	--
						G. div.	32	0	--
						R. lax.	90	0	--
						R. lac.	89	0	--
						Total	5367	0	--
No Pines Ribes Infected	97	Zone	0	0	--	R. nig.	7	7	35
						R. brac.	5111	316	12.3
						R. sang.	37	6	.7
						G. div.	30	1	1.0
						R. lac.	56	0	--
						Total	5240	327	12.4
Total	508	P. mont.	10882	315	7.1	R. nig.	44	19	73.1
		P. stro.	150	14	1.3	R. brac.	12338	443	15.2
		P. lamb.	2	0	--	R. sang.	535	30	21.9
		P. albi.	80	0	--	G. div.	303	22	42.0
						R. lax.	370	102	40.0
						R. acer.	35	0	--
						G. leuc.	60	1	Trace
						R. visc.	82	0	--
						R. lac.	559	14	6.9
						G. R. C.	19	2	Trace
	Grand Total		11114	329	6.9	Totals	14365	623	15.3

*Cultivated red Currant.

Attention is called to certain points in Table No. 43.

1. There were 508 inspections made in western Washington during the summer of 1927. Of this total 156 points, or 30.7% of the total showed either one or both hosts infected.

2. There were 81 inspections made where pines only were found. Of this total, 2 points showed pines infected. The fact that pines were found infected at points where no Ribes were seen, although indicating that insufficient scouting was done, also shows that associated Ribes were scarce.

3. There were 142 inspections made where both hosts were found and examined. Of this total, 57 points or 40.1% of the total showed one or both hosts infected; 12, or 8.4% showed pines only infected; 18, or 12.6% showed Ribes only infected; and 27, or 19% showed both hosts infected.

4. There were 285 inspections made where pines were absent, and Ribes only were examined. Of this total 97 inspection points, or 34% of the total showed Ribes infected.

5. There were 156 inspections made where either one or both of the hosts were found infected. Of this total, 14 points or 9% showed pines only infected; 115 or 73.7% showed Ribes only infected; and 27, or 17.3% showed both hosts infected.

6. All of these figures indicate that blister rust in western Washington is abundant and well distributed, and is beyond hope of stamping out. Furthermore, it is bound to become more and more abundant and extensive, owing to the large number of excellent associations of hosts, and the fact that the rust is already present in many of such associations. Figures presented indicate that infection conditions on the coast range from the stage of introduction to different stages of intensification.

Points in regard to pine infection are brought out in Table No. 44, derived from Table No. 43:

Attention is called to certain points in Table No. 43.

1. There were 508 inspections made in western Washington during the summer of 1927. Of this total 186 points, or 36.7% of the total showed either one or both hosts infected.

2. There were 81 inspections made where pines only were found. Of this total, 2 points showed pines infected. The fact that pines were found infected at points where no Ribes were seen, although indicating that insufficient scouting was done, also shows that associated Ribes were scarce.

3. There were 142 inspections made where both hosts were found and examined. Of this total, 57 points or 40.1% of the total showed one or both hosts infected; 12, or 8.4% showed pines only infected 18, or 12.6% showed Ribes only infected; and 27, or 19% showed both hosts infected.

4. There were 285 inspections made where pines were absent, and Ribes only were examined. Of this total 97 inspection points, or 34% of the total showed Ribes infected.

5. There were 186 inspections made where either one or both of the hosts were found infected. Of this total, 14 points or 7% showed pines only infected; 118 or 73.7% showed Ribes only infected; and 27, or 17.3% showed both hosts infected.

6. All of these figures indicate that blister rust in western Washington is abundant and well distributed, and is beyond hope of stamping out. Furthermore, it is bound to become more and more abundant and extensive, owing to the large number of excellent associations of hosts, and the fact that the rust is already present in many of such associations. Figures presented indicate that infection conditions on the coast range from the stage of introduction to different stages of intensification.

Points in regard to pine infection are brought out in Table No. 44, derived from Table No. 43:

Table No. 44

Analysis of Pine Infection, Western Washington
Summer, 1927

Association of Hosts	Inspection Points	Pine Inspection: Species	Number Exam.	Number Inf.	% Pines Infected	Cankers per Infected Tree
Pines Infected No Ribes	2	P.mont.	100	72	72%	1
Pines Infected Ribes Healthy	12	P.mont.	924	39	4.2%	2.3
		P.stro.	27	0	--	--
Pines Infected Ribes Infected	27	P.mont.	1408	204	14.5%	10.2
		P.stro.	113	14	12.4%	1.8
Total	41	P.mont.	2432	315	13%	7.1
		P.stro.	140	14	10%	1.8
Grand Totals			2572	329	12.8%	6.8

Attention is called to certain points in Table No. 44:

1. It may be observed that at the points where infected pines but no Ribes were found, 72% of the pines were infected. The fact that these two points were insufficiently scouted covers up any significance that the figures might have.

2. The points at which infected pines were associated with infected Ribes showed a higher per cent of pines infected and a larger number of cankers per infected tree than at pine infection points where Ribes were found not infected. This indicates that infection had been present for a longer time at points where both hosts were infected than where pines only showed infection. The greater per cent of trees infected and the larger number of cankers per infected tree at the first named points indicate a greater degree of intensification at the first named points than at the last.

3. The fact that there is shown a greater number of cankers per infected P. monticola than per infected P. strobus is suggestive of the relative susceptibility of the two trees. However, the significance is not properly brought out in Table No. 44. In order to properly judge the relative susceptibility of P. monticola and P. strobus, both trees must be exposed to the same source of sporidia, and this is not shown in Table No. 44. In the discussion of the Pysht, Clallam County infection, in this report, it was demonstrated that in one instance P. monticola was much more susceptible than P. strobus.

Infection of Ribes species occurring in different associations of hosts is shown in Table No. 45, derived from Table No. 43.

Table No. 44

Analysis of Pine Infection, Western Washington

January, 1927

Description of Data	Volume Factor	Number Pines	Number Trees	% Pines Infected	Number Infected Trees per Pine
Pines Infected By Ribes		Ponderosa	170	74	1
Pines Infected Ribes Healthy		Monticola	924	39	2.3
		Strobus	22	--	--
Pines Infected		Monticola	1408	204	14.5%
Pines Infected		Strobus	113	14	12.4%
Total		Monticola	2432	318	13%
		Strobus	140	14	10%
Grand Total			2572	332	12.9%

Attention is called to certain points in Table No. 44:

1. It may be observed that at the points where infected pines but no Ribes were found, 74% of the pines were infected. The fact that these two points were insufficiently accented covers up any significance that the figures might have.

2. The points at which infected pines were associated with infected Ribes showed a higher per cent of pines infected and a larger number of cankers per infected tree than at pine infection points where Ribes were found not infected. This indicates that infection had been present for a longer time at points where both hosts were infected than where pines only showed infection. The greater per cent of trees infected and the larger number of cankers per infected tree at the first named points indicate a greater degree of intensification at the first named points than at the last.

3. The fact that there is shown a greater number of cankers per infected P. monticola than per infected P. strobus is suggestive of the relative susceptibility of the two trees. However, the significance is not properly brought out in Table No. 44. In order to properly judge the relative susceptibility of P. monticola and P. strobus, both trees must be exposed to the same source of sporidia, and this is not shown in Table No. 44. In the discussion of the Pyrk, Clallam County infection, in this report, it was demonstrated that in one instance P. monticola was much more susceptible than P. strobus.

Infection of Ribes species occurring in different associations of hosts is shown in Table No. 45, derived from Table No. 43.

Table No. 45

Ribes Infection, Western Washington
Classified by Association of Hosts.

Association of Hosts	Inspection Points	Ribes Species	Ribes Infection: Number Examined	Number Infected	Per cent Bushes Infected	% Leaves Infected per Infected Bush	% Leaves Infected per Bush Examined
Pines		R.bract.	322	57	17.7%	10.1%	1.78%
Healthy		R.sang.	81	4	5.0%	1.0%	.05%
		G.div.	150	6	4.0%	27.1%	1.08%
Ribes		G.lobbii	15	1	6.6%	Trace	Trace
Infected		R.lac.	77	0	0.0	0.0	.00
	18	Total	645	68	10.5%	10.9%	1.10%
Pines		R.nigrum	12	12	100.0%	99.0%	99.0%
Infected		R.bract.	330	60	18.1%	20.9%	3.8%
		R.sang.	31	23	74.2%	37.4%	27.8%
Ribes		G.div.	23	15	65.2%	80.0%	52.1%
Infected		R.lax.	106	102	96.2%	40.0%	38.5%
		R.lac.	37	14	37.8%	6.9%	2.6%
		R.vulg.	17	2	11.7%	Trace	Trace
	27	Total	556	228	41.0%	38.1%	15.6%
No		R.nigrum	7	7	100.0%	45.0%	45.0%
Pines		R.bract.	5,111	316	16.1%	12.3%	0.76%
		G.div.	26	1	3.8%	1.0%	0.04%
Ribes		R.sang.	27	3	11.1%	0.66%	0.07%
Infected		R.lac.	59	0	0.0	0.0	0.0
	97	Total	5,230	327	6.2%	12.8%	0.8%

Attention is directed to certain points in Table No. 45:

1. The per cent of leaves infected per bush examined is much higher where the Ribes were associated with infected pines, than where pines were absent or not found infected. This increased amount of Ribes infection is due to nearby infected pines. Infection of Ribes where pines are absent or not infected represents the general Ribes infection over the region.

2. Infection on Ribes species associated with infected pines was more dependent on proximity to infected pines than on relative susceptibility of Ribes species. This is shown by the fact that the per cent of leaves infected per bush examined was nearly as high in the case of R. lacustre as of R. bracteosum. R. bracteosum was examined at greater distances from infected pines than was R. lacustre. It is noted that R. laxiflorum showed a high degree of infection. The infected R. laxiflorum were all found at one infection point, at Spirit Lake, where

Table No. 49

Pines Infected by Pathogenic Fungi
Classified by Location of Ports.

Association of Ports	Number Examined	Number Infected	Per cent Number Infected	% Leaves Infected per Bush Examined
Pines				
Healthy				
Pines				
Infected				
Total				
Pines				
Infected				
Pines				
Infected				
Total				
No				
Pines				
Pines				
Infected				
Total				

Attention is directed to certain points in Table No. 49:

1. The per cent of leaves infected per bush examined is much higher where the Ribes were associated with infected pines, than where pines were absent or not found infected. This increased amount of Ribes infection is due to nearby infected pines. Infection of Ribes where pines are absent or not infected represents the general Ribes infection over the region.

2. Infection on Ribes species associated with infected pines was more dependent on proximity to infected pines than on relative susceptibility of Ribes species. This is shown by the fact that the per cent of leaves infected per bush examined was nearly as high in the case of R. lacustre as of R. bracteosum. R. bracteosum was examined at greater distances from infected pines than was R. lacustre. It is noted that R. laxiflorum showed a high degree of infection. The infected R. laxiflorum were all found at one infection point, at Spirit Lake, where

infected pines were numerous and closely associated with the Ribes.

3. There were 7 Ribes species found infected associated with infected pines; 4 Ribes species infected associated with healthy pines; and 4 Ribes species infected where pines were absent.

4. Where Ribes species were found infected, associated with healthy pines, or pines absent, the degree of infection of Ribes species followed closely the previously known relative susceptibility of such Ribes species.

b. Results of scouting classified by counties. Table No. 46 gives the summary of scouting performed in western Washington in the summer of 1927, classified by counties:

| | | |

Table No. 46

Summary of Scouting in western Washington, Classified by Counties
Summer, 1927

Counties	Inspection Points: Healthy	Pines Infec-ted	Ribes Infec-ted	Both Infec-ted	Total	RIBES INSPECTED: R.nigrum Exam.	Inf.	R.bracteosum Exam.	Inf.	R.sanguineum Exam.	Inf.	G.divaricata Exam.	Inf.	R.laxiflorum Exam.	Inf.	R.acerifolium Exam.	Inf.	G.lobbii Exam.	Inf.	R.viscosissimum Examined	Inf.	R.lacustre Exam.	Inf.	Cult.red currants Examined	Infected	Total Ribes Exam.	Inf.	Pines Inspected Exam.	Inf.
Chelan	6	0	0	0	6	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	49	0	122	0
Clallam	44	3	12	6	65	12	12	909	10	27	2	4	0	1	0	0	0	34	1	0	0	33	0	17	2	1,037	67	406	64
Clarke	5	0	0	0	6	0	0	116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	116	0	10	0
Cowlitz	21	0	3	0	24	0	0	761	5	11	0	5	0	30	0	0	0	0	0	0	0	17	0	0	0	814	5	34	0
Grays Harbor	36	0	2	0	38	0	0	697	7	4	0	2	0	66	0	0	0	0	0	0	0	1	0	0	0	741	7	427	0
Island	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
Jefferson	19	2	11	1	33	0	0	1,000	22	7	2	7	1	10	0	20	0	6	0	0	0	31	0	0	0	1,116	26	328	2
King	29	0	6	0	35	5	0	1,434	11	3	0	7	0	0	0	0	0	0	0	0	0	12	0	0	0	1,462	11	284	0
Kitsap	12	2	14	4	32	7	7	540	74	24	0	3	0	0	0	0	0	0	0	0	0	7	4	2	0	587	93	896	79
Kittitas	3	0	0	0	3	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	0	112	0
Lewis	44	0	6	0	50	0	0	1,204	29	110	0	70	4	0	0	0	0	20	0	0	0	70	0	0	0	1,474	33	1,014	0
Mason	17	1	9	0	27	0	0	721	28	10	0	13	0	0	0	0	0	0	0	0	0	4	0	0	0	748	28	186	4
Pierce	33	0	3	0	36	17	0	361	1	74	1	112	2	40	0	0	0	0	0	46	0	161	0	0	0	800	4	368	0
Skagit	6	3	14	3	26	0	0	352	30	10	2	5	0	0	0	0	0	0	0	0	0	1	0	0	0	376	40	466	10
Skamania	34	0	0	1	35	0	0	376	0	21	0	7	0	230	102	0	0	0	0	20	0	59	7	0	0	713	109	3,864	14
Snohomish	31	1	10	2	44	0	0	2,279	47	49	0	12	0	0	0	0	0	0	1	0	0	56	0	0	0	2,396	37	646	16
Thurston	1	1	1	0	3	0	1	62	21	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	62	22	0	0
Whatcom	10	2	10	10	32	0	0	971	76	178	14	56	15	3	0	0	0	0	0	17	0	100	3	0	0	1,325	108	1,774	154
Totals	362	14	118	37	531	43	32	12,..3	443	546	44	303	23	376	102	20	0	60	4	82	0	562	14	17	2	14,006	599	11,114	44

1927 Annual Report
H. N. Putnam

An examination of Table No. 46 discloses the following facts:

1. Infected pines were found in eight counties, namely: Clallam, Jefferson, Kitsap, Mason, Skagit, Skamania, Snohomish, and Whatcom counties.

2. Ribes were found infected in 14 counties or in 78% of total counties examined.

3. R. nigrum bushes were examined in 4 counties and found infected in 2 or 50% of them.

4. R. bracteosum bushes were examined in 17 counties, and found infected in 13 or 76% of them.

5. R. sanguineum bushes were examined in 14 counties and found infected in 6, or 43% of them.

6. G. divaricata bushes were examined in 13 counties, and found infected in 4, or 31% of them.

7. R. laxiflorum bushes were examined in 8 counties, and found infected in 1, or 12½% of them.

8. R. acerifolium bushes were examined in 1 county, and none found infected.

9. G. lobbii bushes were examined in 3 counties and found infected in 1 or 33% of them.

10. R. viscosissimum bushes were examined in 3 counties and none found infected.

11. R. lacustre bushes were examined in 15 counties, and found infected in 3, or 20% of them.

12. Cultivated red currant bushes were examined in 2 counties, and found infected in 1, or 50% of them.

2. Selection of study plots. As a result of scouting in the summer of 1927 several areas were selected as possible future study areas, as follows:

(a) Pysht, Clallam County. P. strobus and P. monticola growing together exposed to same source of sporidia. Excellent opportunity to study relative susceptibility of the two pine species.

(b) Forest Service pine plantations at Buck Creek, Snohomish County. P. strobus and P. monticola planted. Excellent place to study

An examination of Table No. 46 discloses the following facts:

1. Infected pines were found in eight counties, namely: Clallam, Jefferson, Kitsap, Mason, Skagit, Skamania, Snohomish, and Whatcom counties.

2. Ribes were found infected in 14 counties or in 78% of total counties examined.

3. R. <u>nigrum</u> bushes were examined in 4 counties and found infected in 2 or 50% of them.

4. R. <u>bracteosum</u> bushes were examined in 17 counties, and found infected in 13 or 76% of them.

5. R. <u>sanguineum</u> bushes were examined in 14 counties and found infected in 6, or 43% of them.

6. R. <u>divaricata</u> bushes were examined in 13 counties, and found infected in 4, or 31% of them.

7. R. <u>laxiflorum</u> bushes were examined in 8 counties, and found infected in 1, or 12½% of them.

8. R. <u>acerifolium</u> bushes were examined in 1 county, and none found infected.

9. R. <u>lobbii</u> bushes were examined in 3 counties and found infected in 1 or 33% of them.

10. R. <u>viscosissimum</u> bushes were examined in 3 counties and none found infected.

11. R. <u>lacustre</u> bushes were examined in 15 counties, and found infected in 3, or 20% of them.

12. Cultivated red currant bushes were examined in 3 counties, and found infected in 1, or 50% of them.

2. <u>Selection of study plots</u>. As a result of scouting in the summer of 1927 several areas were selected as possible future study areas, as follows:

(a) Lyre, Clallam County. P. <u>strobus</u> and P. <u>monticola</u> growing together exposed to same source of sporidia. Excellent opportunity to study relative susceptibility of the two pine species.

(b) Forest Service pine plantations at Buck Creek, Snohomish County. P. <u>strobus</u> and P. <u>monticola</u> planted. Excellent place to study

relative susceptibility of the two pine species.

(c) Upper Skagit region, Skagit and Clallam Counties. Opportunity to study infection power of *R. lacustre* varying in amounts.

(d) Bremerton region, Kitsap County. Since eradication of wild Ribes is contemplated here, this region presents good opportunity to study effectiveness of control.

3. Location of white pine areas.

Excellent white pine stands of various ages were found all along the western slopes of the Cascades chiefly near the upper limits of streams, but occasionally extending down lower, as in Whatcom County, and along Skagit River.

In addition to the stands of white pine on the slopes of the Cascades, there were good white pine stands found on the slopes of the Olympic mountains.

White pine stands exist near sea level in general vicinity of Everett, and in Kitsap, Mason, Jefferson and Clallam counties.

B. General Statement of Infection Conditions in Western Washington Known to Date.

Table No. 47 shows the number of pine infections found to date in western Washington classified according to year found and county.

Table No. 47

Summary of Pine Infection Areas, Western Washington
Known 1921 to December 31, 1927.

Year Infection 1st Found	Number of Pine Infection Areas by Counties.								
	Clallam	Jefferson	Kitsap	Mason	Skagit	Skamania	Snohomish	Whatcom	Total
1921					1				1
1922								1	1
1923									
1924		2						1	3
1925									
1926	4	3	2						9
1927	12	4	6	1	6	1	3	12	45
Total	16	9	8	1	7	1	3	14	59

Year Infected	Number of Pine Infection Areas by Ranges							
	Jefferson	Green	Ellery	Mason	North Twin-Twin	South Twin-Twin	Total
1920					1		1
1922						1	1
1923							
1924		2				1	3
1925							
1926	1	1					2
1927	14	4	6	1	6	7	1	12	46
Total	15	7	6	1	7	2	1	14	53

While more scouting was done in 1927 in western Washington than had been done in any previous year, nevertheless information in Table No. 47 shows a definite increase in the amount of pine infection in western Washington from 1921 to 1927. There is also indicated a definite extension and establishment of the rust on pines.

Scouting in western Washington has given us evidence that there are two well established centers of pine infection: (1) Kitsap County, in the general vicinity of Bremerton; and (2) Kendall-Maple Falls area in Whatcom County and the Upper Skagit River region in Skagit and Whatcom Counties. It is quite conceivable that the widespread Ribes infection in western Washington came chiefly from these two centers of pine infection.

The pine infection in Skamania County, near Spirit Lake is a young infection. Cankers younger than fruiting are very numerous and in another year or two will be a nearby source of aecia to spread infection to the Wind River region of Washington, and to Oregon.

Infection on Ribes was generally prevalent in counties of Washington west of the Cascades with a decreased amount from the north towards the southwest.

While more scouting was done in 1937 in western Washington than had been done in any previous year, nevertheless information in Table No. 47 shows a definite increase in the amount of pine infection in western Washington from 1936 to 1937. There is also indicated a definite extension and establishment of the rust on pines.

Scouting in western Washington has given us evidence that there are two well established centers of pine infection: (1) Kitsap County, in the general vicinity of Bremerton; and (2) Kendall-Maple Valley area in Whatcom County and the Upper Skagit River region in Skagit and Whatcom Counties. It is quite conceivable that the widespread Alder infection in western Washington came chiefly from these two centers of pine infection.

The pine infection in Skamania County, near Spirit Lake is a young infection. Cankers younger than fruiting are very numerous and in another year or two will be a nearby source of aecia to spread infection to the Wind River region of Washington, and to Oregon.

Infection on Hibes was generally prevalent in counties of Washington west of the Cascades with a decreased amount from the north towards the southwest.

SCOUTING FOR BLISTER RUST IN NORTHERN IDAHO, NORTHEASTERN WASHINGTON AND BRITISH COLUMBIA ADJACENT TO IDAHO AND WESTERN MONTANA

By
H. N. Putnam
Associate Pathologist

I. Introduction

This report covers the scouting for blister rust performed in 1927 in the northern Inland Empire white pine belt exclusive of northwestern Montana. Work done in northeastern Washington, northern Idaho and adjacent British Columbia is reported in one paper because the area is a single unit in regard to pine growing and climatic conditions. The report is classified under work done in Idaho, because the main body of white pines lies in that state.

The purpose, organization of work, method of scouting, and areas to be scouted, are stated in the set of instructions issued to each scout at the beginning of the work. The paper is quoted in full following:

"SCOUTING FOR BLISTER RUST, NORTHERN INLAND EMPIRE WHITE PINE BELT

September 9 to September 30, 1927

Purpose

"The season of 1927 has been particularly favorable for the spread of the rust from pines to Ribes. This is evidenced by the fact that Ribes of all native species have been found infected at many and well distributed points in the Dry Belt of British Columbia at long distances from pines. Pine infection has been found at several points near B. C., 30 miles north of the border. It is a moral certainty that infection on Ribes is present in the Inland Empire. It is up to you as scouts to find this infection, since we have every reason to believe it is here. It is the purpose of this scouting, then, to prove conclusively that blister rust is present in northeastern Washington, northern Idaho and northwestern Montana, and if possible to learn its extent.

Organization of Field Force

"Scouting in Washington and Idaho will be done by five two-man parties, each having an automobile under the direction of H. N. Putnam. Scouting in Montana will be performed by two similar field parties supervised by C. H. Johnson. Each scouting crew will have at least one member familiar with the disease and experienced in looking for it.

By

R. W. Putnam

Associate Pathologist

I. Introduction

This report covers the scouting for blister rust performed in 1927 in the northern Inland Empire pine belt exclusive of western Montana. Work done in northeastern Washington, northern Idaho and adjacent British Columbia is reported in one paper because the area is a single unit in regard to pine growing and climatic conditions. The report is classified under work done in Idaho, because the main body of white pines lies in that state.

The purpose, organization of work, method of scouting, and areas to be scouted, are stated in the set of instructions issued to each scout at the beginning of the work. The paper is divided in full as follows:

September 9 to September 30, 1927

Purpose

"The season of 1927 has been particularly favorable for the spread of the rust from pines to Ribes. This is evidenced by the fact that Ribes of all native species have been found infected at many and well distributed points in the Dry Belt of British Columbia at long distances from pines. The infection has been found at several points near B. C., 30 miles north of the border. It is a moral certainty that infection on Ribes is present in the Inland Empire. It is up to you as scouts to find this infection, since we have every reason to believe it is here. It is the purpose of this scouting, then, to prove conclusively that blister rust is present in northeastern Washington, northern Idaho and northwestern Montana, and if possible to learn its extent.

Organization of Field Force

"Scouting in Washington and Idaho will be done by five two-man parties, each having an automobile under the direction of R. W. Putnam. Scouting in Montana will be performed by two similar field parties supervised by C. H. Johnson. Each scouting crew will have at least one member familiar with the disease and experienced in looking for it.

Method of Scouting

"In looking for the rust emphasis will be placed on inspection of Ribes until infection is found, at which time associated pines will be examined carefully for signs of the disease.

"The area allotted to each crew will be sufficiently small to permit an intensive search for the disease. It will be one of the duties of each leader to study his area and plan his work so that all portions will be equally covered in the time allotted.

"Beginning with the most susceptible, the common Ribes in this region fall into the following order of susceptibility to the rust and consequent importance in scouting:

Ribes nigrum, cultivated black currant.
R. petiolare, wild black currant.
Grossularia inermis, white stemmed gooseberry.
R. viscosissimum, sticky currant.
R. lacustre, spiny currant.

"The shade and half-shade forms of most Ribes species are more susceptible than those in the open. Ribes growing along streams or in the presence of moisture present conditions favorable to blister rust infection. Hence in scouting for the rust, special attention should be given to scouting Ribes along streams and in the shade.

"Inspection points for examining Ribes should be carefully chosen. Two methods of selection will be used as follows: (1) Ribes will be inspected at 5 mile intervals along all roads or trails covered. The distances will be determined by speedometer readings on roads, and estimated as accurately as possible on trails. (2) If, in the judgment of the experienced scout of each party, a particularly favorable location is seen between the 5 mile locations, an additional inspection point should be established. These should be based on the presence of susceptible Ribes, occurring in conditions which the experienced scout recognizes as favoring infection.

"The purpose of this double system is to (1) systematically cover the region, and (2) also inspect at points most favorable to the development of the rust.

"All scouting performed will be recorded on the scouting report forms. Each inspection point will be located as accurately as possible on a county or provincial map, and given a number. Inspection points will be numbered chronologically in each county or province.

Assignment of Areas

Method of Scouting

"In looking for the rust enemies will be placed on inspection of Ribes until infection is found, at which time associated pines will be examined carefully for signs of the disease.

"The area allotted to each crew will be sufficiently small to permit an intensive search for the disease. It will be one of the duties of each leader to study his area and plan his work so that all portions will be equally covered in the time allotted.

"Beginning with the most susceptible, the common Ribes in this region fall into the following order of susceptibility to the rust and consequent importance in scouting:

R. lacustre, spiny currant.
R. viscosissimum, sticky currant.
Grossularia inermis, white stemmed gooseberry.
R. petiolare, wild black currant.
Ribes nigrum, cultivated black currant.

"The shade and half-shade forms of most Ribes species are more susceptible than those in the open. Ribes growing along streams or in the presence of moisture present conditions favorable to blister rust infection. Hence in scouting for the rust, special attention should be given to scouting Ribes along streams and in the shade.

"Inspection points for examining Ribes should be carefully chosen. Two methods of selection will be used as follows: (1) Ribes will be inspected at 5 mile intervals along all roads or trails covered. The distances will be determined by roadometer readings on roads, and estimated as accurately as possible on trails. (2) It, in the judgment of the experienced scout of each party, a particularly favorable location is seen between the 5 mile locations, and additional inspection point should be established. These should be based on the presence of susceptible Ribes, occurring in conditions which the experienced scout recognizes as favoring infection.

"The purpose of this double system is to (1) systematically cover the region, and (2) also inspect at points most favorable to the development of the rust.

"All scouting performed will be recorded on the scouting reports forms. Each inspection point will be located as accurately as possible on a county or provincial map, and given a number. Inspection points will be numbered chronologically in each county or province.

Assignment of Areas

"Edmunds and Robertson will cover that portion of Idaho lying north of Clark Fork River to the boundary. This includes that portion of the Kaniksu National Forest lying in Idaho and the north half of the Pend Oreille National Forest.

"Ganoung and Hawley will scout that portion of Idaho lying south of Clark Fork River to the divide between the Coeur d'Alene and St. Maries Rivers. This includes all of the Coeur d'Alene National Forest and the southern half of the Pend Oreille National Forest.

"Hornibrook and Lindh will scout that portion of northeastern Washington bounded on the west by the Columbia from Gifford north to the boundary; on the north by the international boundary; on the east by Idaho; and on the south by a line between Gifford and Newport. This area includes that portion of the Kaniksu National Forest lying in Washington.

"Whidden and Tonning will scout that portion of northeastern Washington bounded on the east by the Columbia River from Gifford north to the boundary; on the south by a line extending west from Gifford to the San Poil River; on the west by the San Poil River to the boundary; and on the north by the international boundary. This includes the extreme eastern portion of the Colville National Forest.

"MacLeod and Jones will scout that portion of the Kootenai District of British Columbia along the roads from Kingsgate through Cranbrook and Elko to Gateway.

"Putnam and Joy will scout points in the entire region not otherwise covered."

II. Summary of Scouting Performed Previous to 1927

A. Northern Idaho

Northern Idaho has been more or less thoroughly scouted for blister rust each year since and including 1922. Previous to 1927 no blister rust had been found.

B. Northeastern Washington

Previous to 1927 northeastern Washington has been more or less thoroughly scouted each year since and including 1922. In no year previous to 1927 except in 1923 has blister rust been found in northeastern Washington.

In 1923 blister rust was found in northeastern Washington on

"Edmunds and Robertson will cover that portion of Idaho lying north of Clark Fork River to the boundary. This includes that portion of the Kaniksu National Forest lying in Idaho and the north half of the Pend Oreille National Forest.

"Canning and Hawley will scout that portion of Idaho lying south of Clark Fork River to the divide between the Coeur d'Alene and St. Maries Rivers. This includes all of the Coeur d'Alene National Forest and the southern half of the Pend Oreille National Forest.

"Hornbrook and Linda will scout that portion of northwestern Washington bounded on the west by the Columbia from Clifford north to the boundary; on the north by the international boundary; on the east by Idaho; and on the south by a line between Clifford and Newport. This area includes that portion of the Kaniksu National Forest lying in Washington.

"Whidden and Fanning will scout that portion of northwestern Washington bounded on the east by the Columbia River from Clifford north to the boundary; on the south by a line extending west from Clifford to the San Poil River; on the west by the San Poil River to the boundary; and on the north by the international boundary. This includes the extreme eastern portion of the Colville National Forest.

"Macleod and Jones will scout that portion of the Kootenai District of British Columbia along the roads from Kingsgate through Cranbrook and Kimberley to Gateway.

"Putnam and Foy will scout points in the entire region not otherwise covered."

II. Summary of Scouting Performed Previous to 1927

A. Northern Idaho

Northern Idaho has been more or less thoroughly scouted for blister rust each year since and including 1922. Previous to 1927 no blister rust had been found.

B. Northeastern Washington

Previous to 1927 northeastern Washington has been more or less thoroughly scouted each year since and including 1922. In no year previous to 1927 except in 1923 has blister rust been found in northeastern Washington. In 1923 blister rust was found in northeastern Washington on

62 Ribes nigrum and one cultivated red currant. These infected Ribes were found in nine plantings near the Canadian line, eight of which were in Okanogan County, and one in Ferry County. The one infected red currant was touching an infected black currant. In the immediate vicinity of the infected black currants, over 2,000 wild Ribes including R. petiolare were examined and no infection found. The infected black currant plantings were destroyed. No pines were near enough the infected Ribes to become infected.

C. Southeastern British Columbia

Previous to 1927 annual scouting has been performed since 1922, in southeastern British Columbia immediately adjacent to eastern Washington, Idaho and western Montana. In 1923 infection was found on R. nigrum at one point near Grand Forks and at two points at Willow Point near Nelson. At Grand Forks no pines were associated. At Willow Point pines were within 1,500 feet of the infected R. nigrum bushes.

In 1925 the blister rust on R. nigrum was found in the general vicinity of Nelson, B. C. at four localities, namely: Harrop, Proctor, Willow Point and Taghum. At Willow Point in 1925 near the R. nigrum found infected that same year, western white pines were found infected. The pine infection was young. Few cankers had reached the fruiting stage. These cankered pines were one and one-half miles from the R. nigrum found infected in 1923.

In 1926 two additional pine infections were found, namely at Crawfords Bay and Proctor, B. C., both infections chargeable to R. nigrum.

III. Results of Scouting in 1927

A. Area Scouted

The area scouted in 1927 included the portions listed in "Assignment of Areas" as well as a part of Okanogan County, Washington and the region around St. Maries, and Clarkia, Idaho.

B. Results of Scouting in Idaho by Counties

There is given below a statement of scouting done in each county of Idaho.

1. Benewah County. Table No. 1 gives a record of scouting performed in Benewah County, Idaho, classified according to association of hosts. No infection was found on either pines or Ribes.

III. Results of Scouting in 1927

A. Area Scouted

The area scouted in 1927 included the portions listed in "Limitation of Areas" as well as a part of Okanogan County, Washington and the region around Mt. Marley, and Clarkia, Idaho.

B. [illegible] in North Dakota

There is also here a discovery of scouting done in west[illegible] of Idaho.

1. Results of Scouting. Table No. 1 gives a record of scouting [illegible] Spokane County, Idaho, classified according to species [illegible]. No infection was found on either pines or Ribes.

Table No. 1

Analysis of Scouting
Benewah County, Idaho

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Healthy Pines	4	31	0	--	R.pet.	125	0	--		
					G.iner.	4	0	--		
					R.visc.	7	0	--	1'-100'	?
Healthy Ribes					R.lac.	4	0	--		
	1	0	0	--	R.pet.	15	0	--		
					G.iner	10	0	--	101'-300'	?
					G.irrig.	2	0	--		
	2	1	0	--	R.pet.	11	0	--		
					G. iner.	10	0	--	301'-500'	?
					R.visco.	82	0	--		
	2	0	0	--	R.pet.	125	0	--	501'-1000'	?
					G.iner.	4	0	--		
Total	9	32	0	--	R.pet.	276	0	--	--	
					G.iner.	28	0	--	--	
					G.irrig.	2	0	--	-	?
					R.visc.	89	0	--	--	
					R.lac.	4	0	--	--	
Grand Total						399	0	--	--	?

2. Bonner County, Idaho

a. Record of scouting performed. Table No. 2 shows the results of scouting in Bonner County, classified according to association of hosts.

Table No. 1

Analysis of Sampling
Peanut Sports, Lints

Insect-ations of Nuts	No. of Insects Pairs	Flies Inspecting Adults Emerging	Pairs Mating	Females Dying	Flies Dissected Females Containing Eggs	Flies Dissected Females Containing Sperm	Flies Dissected Females Containing Both	Flies Dissected Females Containing Neither	Flies Dissected Females Containing Unknown	Flies Dissected Females Containing Total	Flies Dissected Females Containing Percentage	Flies Dissected Females Containing Remarks
Insect-ations of Nuts	No. of Insects Pairs	Adults Emerging	Pairs Mating	Females Dying	Females Containing Eggs	Females Containing Sperm	Females Containing Both	Females Containing Neither	Females Containing Unknown	Females Containing Total	Females Containing Percentage	Females Containing Remarks

Table No. 2

Analysis of Scouting, Bonner County, Idaho

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy	51	68	0	--	R.nig.	7	0	--		
					G.iner.	204	0	--		
					G.irrig	1	0	--		
					R.visc.	453	0	--	1410'	?
					R.lac.	752	0	--		
Ribes Healthy					R.)Cult. G.) Sp.	10	0	--		
	2	0	0	--	G.iner.	2	0	--		
					R.visc.	35	0	--	101'-300'	?
					R.lac.	1	0	--		
	1	0	0	--	R.)Cult. G.) Sp.	38	0	--	301'-500'	?
	1	0	0	--	G.iner.	2	0	--	501'-1000'	?
No Pines	17	0	0	--	G.iner.	47	0	--		
					G.irrig	1	0	--		
					R.visc.	133	0	--		?
Ribes Healthy					R.lac.	212	0	--		
					R.)Cult. G.) Sp.	17	0	--		
Pines Healthy Ribes Infected	1	12	0	--	G.iner.	6	2	7%	47'	?
Totals	73	80	0	--	R.nig.	7	0	--		
					G.iner.	261	2	7		
					G.irrig	2	0	--		
					R.visc.	631	0	--		?
					R.lac.	965	0	--		
					R.)Cult. G.) Sp.	65	0	--		
Grand Total						1,921	2	7%	?	?

b. Details of Ribes infection. The G. inermis infection listed in Table No. 2 is the only one known to exist in Idaho at the present time. There follows a detailed description of this infection.

Table No. 2

Analysis of Examiner's Report Cards, Idaho

Area of Inspection	No. of Inspections	Tree Inspection: Branches	Tree Inspection: Trees	Tree Inspection: Diseases Other Than Pear Blight Infected Trees	Tree Inspection: Pear Blight Infected Trees	Tree Inspection: Pear Blight Destroyed Trees	Tree Inspection: Grand Total	Tree Inspection: Diseases	Tree Inspection: Insects	Tree Inspection: Grand Total	Tree Inspection: Pear Blight Infected Trees	Tree Inspection: Pear Blight Destroyed Trees	Tree Inspection: Grand Total	Distance from Ribes to Pines: Infected	Distance from Ribes to Pines: Destroyed
Pines	51	64	0	--											
Healthy															
Ribes															
Healthy															
	2	0	0	--											
	1	0	0	--											
	1	0	0	--											
Total	55	64	0	--											
Pines	17	0	0	--											
Ribes															
Healthy															
	1	14	0	--											
Grand Total															

b. Details of Ribes infection. The G. inermis infection listed in Table No. 2 is the only one known to exist in Idaho at the present time. There follows a detailed description of this infection.

Location: 7.6 miles north of Priest River on West Branch road. Township 57 N., R. 5 W., Section 23.

Inspector: Robertson and Edmunds, September 30, 1927.

Pine Inspection: There were P. monticola trees, 11 to 20 years old, within 40 feet of infected G. inermis. 12 pines were examined. None was found infected.

Ribes inspection: 6 G. inermis bushes were examined. 2 infected. 7% of leaves infected per infected bush. Infected surface bore 50% uredinia, 50% telia.

Remarks: This will be a good area for inspection of pines next fall and the year following.

3. Boundary County, Idaho. No infection, either on pines or Ribes was found. Table No. 3 gives the results of scouting classified according to association of hosts.

Table No. 3

Analysis of Scouting, Boundary County, Idaho

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy	8	37	0	--	R.visc.	5	0	--	1'-100'	?
					R.lac.	91	0	--		
Ribes Healthy	6	14	0	--	G.iner.	2	0	--	101'-300'	?
					R.lac.	40	0	--		
No Pines Ribes Healthy	25	0	0	--	R.nigrum	18	0	--	?	?
					G.iner.	37	0	--		
					R.visc.	30	0	--	?	?
					R.lac.	196	0	--		
					Cult.R.C. & Goose.	23	0	--	?	?
Totals	39	51	0	--	R.nigrum	18	0	--		
					G.iner.	39	0	--		
					R.visc.	35	0	--	?	?
					R.lac.	327	0	--		
					Cult.R.C. & Goose.	23	0	--		
Grand Total						442	0	--		

Location: 7.6 miles north of Priest River on West Branch road. Township 57 N., R. 5 W., Section 13.

Inspector: Robertson and Edmunds, September 30, 1927.

Pine Inspection: There were 7 ponderosa trees, 11 to 30 years old, within 40 feet of infected 6. insignis. 12 pines were examined. None was found infected.

Ribes Inspection: 6 6. inermis bushes were examined. 3 infected. 75 of leaves injured per infected b.. Infected surface bore 80% uredinia. 20% telia.

Remarks: This will be a good area for inspection of pines next fall and the year following.

6. Boundary County, Idaho. No infection, either on pines or Ribes was found. Table No. 4 gives the results of accruing classified according to association of hosts.

Table No. 4

Analysis of County, Boundary County, Idaho

Stand-ards	No. of Inspec-tion Points	Pine Inspection				Ribes Inspection				Distance from Ribes to Pines
		Examined	Infected	Per cent Infected	Species Affected	Examined	No. Infected	No. Infected per Bush	% Leaves Infected	
Pines	8	82	0	—	R.vise.	8	0	—		1-100'
Healthy					R.lac.	91	0	—		
Ribes	6	14	0	—	G.inser.	5	0	—		101'-
Healthy					R.lac.	40	0	—		300'
[illegible]	25	0	0	—	R.nigrum	12	0	—		?
Pines					R.l.r.	35	0	—		?
					R.vise.	37	0	—		?
Ribes					R.lac.	127	0	—		?
Healthy					Cult.(2)					
					G.(pale)	23	0	—		?
Totals	39	91	0	—	R.nigrum	12	0	—		
					G.inser.	35	0	—		
					R.vise.	39	0	—		?
					R.lac.	327	0	—		
					Cult.(2)					
					G.(pale)	23	0	—		
Grand Total						442	0	—		

4. Kootenai County, Idaho. No infection, either on pines or Ribes was found in Kootenai County. Table No. 4 gives the results of scouting classified according to association of hosts.

Table No. 4

Analysis of Scouting, Kootenai County, Idaho

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy Ribes Healthy	25	34	0	--	G.inar.	46	0	--		
					R.vise.	151	0	--	1'-100'	?
					R.lac.	463	0	--		
	3	0	0	--	G.inar.	55	0	--		
					R.lac.	15	0	--	101'-300'	?
					Vulg. (C.) & Grossa.	3	0	--		
	1	1	0	--	R.vise.	2	0	--	301'-500'	?
	5	35	0	--	G.inar.	1	0	--		
					R.vise.	53	0	--	1000'+	?
No Pine Ribes Healthy	1	6	0	--	R.vise.	100	0	--	?	?
Totals	35	75	0	--	G.inar.	72	0	--		
					R.vise.	306	0	--		
					R. lac.	478	0	--		
					Vulg. (C.) & Grossa.	3	0	--		
Grand Total						969	0	--		

5. Shoshone County, Idaho. No infection, either on pines or Ribes was found in Shoshone County. Table No. 5 gives the results of scouting classified according to association of hosts.

Analysis of Table No. 5 Ferry County

Analysis of Scouting, Shoshone County, Idaho

Association of Hosts	No. of Insp. Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to Pines: Healthy Pines	Distance from Ribes to Pines: Infected Pines
Pines Healthy	20	32	0	--	R.pet.	1,020	0	--		
					R.iner.	64	0	--		
					R.irris	110	0	--	1'-100'	
					R.visc.	404	0	--		
Ribes Healthy					R. lac.	395	0	--		
	1	0	0	--	R.irrig.	11	0	--	301'-500'	
	1	0	0	--	R.iner.	5	0	--	1000'+	
No Pines Ribes Healthy	2	0	0	--	R. irrig.	14	0	--		
					R.visc.	4	0	--		
					R.lac.	110	0	--		
Totals	24	32	0	--	R.pet.	1,020	0	--		
					R.iner.	69	0	--		
					R.irrig.	125	0	--		
					R.visc.	408	0	--		
					R.lac.	505	0	--		
Grand Total						2,127	0	--		

C. Results of Scouting in Northeastern Washington by Counties

The results of scouting in northeastern Washington are shown by counties.

1. Ferry County

a. Record of scouting performed. Table No. 6 gives the results of scouting in Ferry County, Washington, classified according to association of hosts.

Analysis of Counting, Terrapene County, Iowa

Associations of Plants	No. of Individuals	Time Investigated			Plot Investigation			Distance From Plants to
		Examination Period	Time Spent	Examiners per Type	Species Found	No. Examined	No. Infected	Fecundated Plants
Trees	20	2d	3	--	C.cas.	1,000	--	--
Heavily					A.tuber.	84	--	--
					C.tort.	140	--	--
					S.vel.	414	--	--
Slope					S. lac.	290	--	--
Heavily	1	0	1	--	C.fili.	11	--	--
	1	0	3	--	C.tort.	6	--	--
Scrubs	5	0	7	--	C.rig.	14	--	--
Slope					A.vim.	4	--	--
Heavily					A.tor.	110	--	--
Total:	24	2d	3	--	A.pal.	1,000	--	--
					C.tor.	80	--	--
					C.rig.	120	--	--
					A.vim.	410	--	--
					S.tor.	910	--	--
Grand Total						3,187	--	--

C. Results of Counting in Northeastern Washington by Counties

The results of counting in northeastern Washington are shown by communities.

1. Terry County

1. Record of counting performed. Table No. 6 gives the results of counting in Terry County, Washington, classified according to association of hosts.

Table No. 6

Analysis of Scouting, Ferry County, Wash.

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
Pines Healthy No Ribes	1	75	0	--	0	0	0	0	--	--
Ribes Healthy No Pines	19	0	0	--	R.pet.	178	0	0		
					G.iner.	38	0	0		
					R.visc.	60	0	0	?	?
					R.lac.	301	0	0		
					C) Cult.					
					R) Sp.	2	0	0		
Ribes Infected No Pines	1	0	0	--	G.iner.	14	2	15	?	?
	1	0	0	--	R.lac.	24	0	0		
					R.pet.	3	1	60	?	?
	1	0	0	--	R.lac.	3	0	0		
					R.pet.	2	0	0	?	?
					G.iner.	10	2	10		
	1	0	0	--	G.iner.	2	0	0		
					R.pet.	25	1	10	?	?
	1	0	0	--	R.pet.	75	1	10	?	?
Total	25	75	0	--	R.pet.	283	3	27		
					G.iner.	64	4	13		
					R.visc.	60	0	0	?	?
					R.lac.	328	0	0		
					G.) Cult.					
					R.) Sp.	2	0	0		
Grand Total						737	7	19	?	?

An examination of Table No. 6 shows the following facts:

(1). No inspections were made where pines and Ribes were both present and associated.

(2). Two Ribes species were found infected, namely R. petiolare, and G. inerme.

(3). The one pine inspection made in Ferry County was made at the summit of the divide between Colville and Republic.

Table No. 6

Analysis of Examined, Perry County, Ohio

Association of Species	No. of Inspection Points	Pine Inspection: Examined	Infected	Percentage Infected	Ribes Inspection: Species	Examined	Infected	Percentage Infected	Distance from Pines to Ribes: Examined	Infected
Pines Healthy No Ribes	1	75	0	--		0			--	--
Ribes Healthy No Pines	18	0	0	--	R. rot.	172	0	0		
					R. iner.	82	0	0		
					R. visc.	61	0	0		
					R. lec.	801	0	0		
					R. Cruik.					
					R. sp.	2	0	0		
Ribes Infected No Pines	1	0	0	--	G. inerm.	14	2	15	1	1
Infected No Pines	1	0	0	--	R. lac.	44	0	0		
					R. rot.	2	1	60	1	1
	1	0	0	--	R. lec.	2	0	0		
					R. rot.	3	0	0	1	1
					R. iner.	10	2	10		
	1	0	0	--	R. liqr.	1	0	0		
					R. rot.	10	1	10	1	1
	1	0	0	--	R. rot.	2	1	10	1	1
Total	22	75	0	--	R. rot.	482	3	1.7		
					G. inerm.	84	4	1.4		
					R. visc.	63	0	0		
					R. lec.	829	1	0		
					R. Cruik.					
					R. sp.	2	0	0		
Grand Total						1417	7	1.5	1	1

In examination of Table No. 6 shows the following facts:

(1). No inspections were made where pines and Ribes were both present and associated.

(2). Two Ribes species were found infected, namely R. petiolare, and G. inermis.

(3). The one pine inspection made in Perry County was made at the summit of the divide between Golville and Nemphis.

F. albicaulis at this point was abundant, and was located about 3 miles from R. petiolare found infected.

b. Details of Ribes infection. There is given below a detailed description of each Ribes infection point:

Name: McKay Infection. Inspection No. 3

Location: 3 miles east of Republic, Ferry County on road to Curlew on San Poil River. Township 36 N., R. 33 E. Section 4.

Inspector: Tonning. September 14, 1927.

Pine situation: No pines known within several miles.

Ribes inspection: 14 G. inermis inspected in partial shade. 2 found infected. 15% leaves infected per infected bush. Infected surface bore 10% uredinia, 90% telia. No R. petiolare found.

Inspection No. 7: Ferry County

Location: On San Poil River, 8 miles south of Republic on Keller Road. Township 35 N., R. 32 E., Section 12.

Inspector: Tonning. September 15, 1927.

Pine situation: No pines found.

Ribes inspection: 24 R. lacustre examined, none found infected. 3 R. petiolare examined, 1 infected. 60% leaves infected per infected bush. 10% uredinia, 90% telia. Bushes growing in half shade under alder growth.

Inspection No. 15: Ferry County

Location: 3 miles west of Republic, Ferry County on road to Tonasket, on Granite Creek. Township 36 N., R. 32 E., Section 3.

Pine situation: No pines seen.

Ribes inspection: 24 R. lacustre examined, none found infected. 3 R. petiolare examined, 1 infected. 60% leaves infected per infected bush. 10% uredinia, 90% telia. Bushes growing in half shade under alder growth.

Inspection No. 15: Ferry County

Location: 3 miles west of Republic, Ferry County on

7. Silviella at this point are abundant, and are located about 5 miles from R. pellalare found infected.

B. Details of this infection. There is given below a detailed description of each Ribes infection point:

Name: McKay Infection. Inspection No. 3

Location: 3 miles east of Republic, Perry County on road to Custer at Tom Hill Creek. Township 36 N., R. 33 E. Section 4.

Inspector: Fanning. September 14, 1927.

Pine situation: No pines known within several miles.

Ribes situation: 14 G. inermis inspected in partial shade. 2 found infected. 11% leaves infected per infected bush. In-fected surface bore 10% uredinia, 90% telia. No R. pellalare found.

Inspection No. 7: Perry County

Location: On San Poil River, 8 miles south of Republic on Miller Road. Township 35 N., R. 32 E., Section 12.

Inspector: Fanning. September 15, 1927.

Pine situation: No pines found.

Ribes inspection: 24 R. lacustre examined, none found infected. 2 R. pellalare examined, 1 infected. 50% leaves infected per infected bush. 10% uredinia, 90% telia. Bushes growing in half shade under alder growth.

Inspection No. 15: Perry County

Location: 3 miles west of Republic, Perry County on road to Tomasket, on Granite Creek. Township 36 N., R. 32 E., Section 3.

Pine situation: No pines seen.

Ribes inspection: 24 R. lacustre examined, none found infected. 3 R. pellalare examined, 1 infected. 50% leaves infected per infected bush. 10% uredinia, 90% telia. Bushes growing in half shade under alder growth.

Inspection No. 15: Perry County

Location: 3 miles west of Republic, Perry County on

road to Tonasket, on Granite Creek. Township 36 N., R. 32 E. Section 3.

Pine situation: No pines seen.

Ribes inspection: 3 R. lacustre, 2 R. petiolare examined none found infected. 10 G. inermis examined, 2 found infected. 10% of leaves infected per infected bush. Bushes growing under alders.

Inspection No. 23: Ferry County

Location: 2 miles west of summit between Colville and Republic, 14 miles east of Republic, Ferry County, on road towards Colville, Washington, on small creek. Township 36 N., R. 34 E., Section 14.

Inspectors: Putnam and Joy. September 16, 1927.

Pine situation: P. albicaulis within 3 miles on summit. Not inspected. These pines examined later by Tonning and Whidden. No infection found.

Ribes inspection: 75 R. petiolare examined. One found infected. 10% of leaves infected per infected bush. 20% uredinia, 80% telia. Leaves on bushes still green. Bushes not defoliated, growing in open, not surrounded by timber. Elevation approximately 4800 feet.

Remarks: This infection points to the strong possibility of P. albicaulis being infected somewhere in the general vicinity. This area should be inspected carefully again in 1928.

Inspection Point: No. 24 Ferry County

Location: 4½ miles west of summit between Republic and Colville, 11½ miles east of Republic, Ferry County, Washington, on road to Colville. Township 36 N., R. 34 E., Section 9.

Inspectors: Putnam and Joy. September 16, 1927.

Pine situation: P. albicaulis approximately 5 miles east of this infection.

Ribes inspection: 2 G. inermis examined, none found infected. 25 R. petiolare examined, one found infected. 10% of leaves infected per infected bush. 20% uredinial production, 80% telial. Bushes growing in open.

Remarks: This infection approximately 2 miles from Inspection Point No. 23.

Inspection Point No. 21.

Location: 2 miles west of summit between Colville and Republic, 14 miles east of Republic, Perry County, on road toward Colville, Washington, on small creek. Township 38 N., R. 34 E., Section 14.

Inspectors: Putnam and Jay. September 16, 1937.

Pine attacked: P. albicaulis within 2 miles on summit. Not inspected. These pines examined later by Tonsing and Hidden. No infection found.

Other species: 7 R. petiolare examined. One found infected. 10% of leaves infected were dried brown. 80% uredinia, 80% telia. Leaves on branches still green. Branches not defoliated, growing in open, not surrounded by timber. Elevation approximately 4800 feet.

Remarks: This infection points to the strong possibility of P. albicaulis being infected somewhere in the general vicinity. This area should be inspected carefully again in 1938.

Inspection Point: No. 24 Perry County

Location: 4½ miles west of summit between Republic and Colville, 11½ miles east of Republic, Perry County, Washington, on road to Colville. Township 38 N., R. 34 E., Section 9.

Inspectors: Putnam and Jay. September 16, 1937.

Pine attacked: P. albicaulis approximately 5 miles east of this infection.

Other species: 3 R. laevis examined, none found infected. 25 R. petiolare examined, one found infected. 10% of leaves infected per infected bush. 20% uredinial production; 80% telial. Bushes growing in open.

Remarks: This infection approximately 2 miles from

The five Ribes infection points in Perry County were all grouped around Republic, within 14 miles of the city on the east; 3 miles west; and 8 miles south. The country in the vicinity of infections is open, rolling, and does not support coniferous growth. The findings point to a strong possibility of aecial sources of infection existing among P. albicaulis on the summit of the mountains east of Republic. This area should be scouted in 1928 to find such infected P. albicaulis if it is present.

2. Okanogan County

a. Record of scouting performed. Table No. 7 gives the results of a short scouting trip in Okanogan County, classified according to association of hosts.

Table No. 7

Analysis of Scouting, Okanogan County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection			Ribes Inspection				Distance from Ribes to	
		Examined	Infected	Cankers per Infected Tree	Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Healthy Pines	Infected Pines
No Pines Ribes Healthy	2	0	0	--	R.pet.	50	0	--	?	?
					G.iner.	19				
No.Pines Ribes Infected	1	0	0	--	R.pet.	20	1	60		
					G.iner.	3	0	--	?	?
					R.lac.	3	0	--		
	1	0	0	--	R.pet.	9	7	50	?	
					G.iner.	2	2	80		
Totals	4	0	0	--	R.pet.	79	8	51		
					G.iner.	21	2	30	?	?
					R.lac.	3	0	--		
Grand Total						102	10	47	?	?

b. Details of Ribes infection. There follows a detailed description of each Ribes infection found in Okanogan County:

Inspection No. 2: Okanogan County

Location: On Colville Indian Reservation, 1½ miles southeast of Disoutels, 19 miles southeast of Omak on road to Nespelem, Washington. Township 33 N., R. 29 E., Section 17.

The five Ribes infection points in Terry County were all grouped around Hepphile, within 14 miles of the city on the east; 3 miles west; and 8 miles south. The country in the vicinity of infections is open, rolling, and does not support coniferous growth. The findings point to a strong possibility of aerial sources of infection existing among P. albicaulis on the summit of the mountains east of Hepphile. This area should be scouted in 1938 to find such infected P. albicaulis if it is present.

2. Okanogan County

a. Record of scouting performed. Table No. 7 gives the results of a short scouting trip in Okanogan County, classified according to association of hosts.

Table No. 7

Analysis of Scouting, Okanogan County, Washington

Association of Hosts	No. of Infected Plants	Time Inspection			Ribes Inspection			Distance From Ribes to	
		Examined	Infected	Checked	Examined	Infected	Leaves Examined	Infected Ribes	Healthy Ribes
No Pines	2	0	0	--	80	0	--	1	1
Ribes Present					R.vet. 40 R.iner. 40				
No.1 Pines Infected	1	0	0	--	R.pet. 30 R.iner. 2 R.lac. 2	1 0 0	80 -- --	1	1
	1	0	0	--	R.vet. 5 R.iner. 2	2 0	40 --	1	
Totals	4	0	0	--	R.vet. 75 R.iner. 44 R.lac. 2	3 2 0	81 80 --		1
Grand Totals					192	10	47	1	1

b. Details of Ribes Infection. There follows a detailed description of each Ribes infection found in Okanogan County:

Infection No. 1: Okanogan County

Location: On Oroville Indian Reservation, 1½ miles southeast of Nicomtele, 18 miles southeast of Omak on road to Nespelem, Washington. Township 36 N., R. 28 E., Section 17.

Inspectors: Joy and Putnam. September 17, 1927.

Pine situation: Possibility of P. albicaulis existing on high ridges 8 or 10 miles distant.

Ribes inspection: Table No. 8 gives the results of Ribes inspection at this point.

Table No. 8

Ribes Inspection Colville Indian Reservation

Ribes Species	Number Examined	Number Infected	% Leaves Infected per Infected Bush	Per Cent Infected Surface Bearing Uredinia	Telia	Necrotic
R.petiolare	9	7	50%	20	75	5
G.inermis	2	2	30%	40	60	

These bushes on small stream in open yellow pine type at elevation of about 4,000 feet. Considerable very recent uredinial intensification. G. inermis under infected R. petiolare showed uredinial development. There were a few spots on each leaf, but not so abundant as on R. petiolare.

Inspection No. 3: Okanogan County

Location: 5½ miles southeast of Disoutels on road between Okanogan and Nespelem. Township 33N., R. 29 E., Section 22.

Inspectors: Putnam and Joy. September 17, 1927.

Pine situation: Possibility of P. albicaulis existing on high ridges 5 to 7 miles distant.

Ribes inspection: 2 R. lacustre, 3 G. inermis examined none found infected. 20 R. petiolare examined, 1 found infected, 60% of leaves infected, 30% uredinial and 70% telial production. It was evident that considerable uredinial intensification had taken place since the rains, or within 2 weeks of time of examination.

3. Pend Oreille County. Pines are abundant and well distributed in the north and eastern part of the county.

a. Record of scouting performed. Table No. 9 shows the results of scouting in Pend Oreille County, classified according to association of hosts.

Inspectors: Coy and Putnam. September 17, 1927.

Pine situation: Possibility of P. albicaulis existing on high ridges 8 or 10 miles distant.

Mines inspection: Work 75. Clean the results of mines inspection at this point.

Table No. 8

Mines Inspection Orville Initial Reservation

Mines Examined	Number Infected	Infected Not	Per Cent Infected Surface Bearing Ponderosa	Pole	Western
P. ponderosa	7	7	50	75	5
G. insignis	2	2	50%	40	60

Mines inspection on small strips in open yellow pine type at elevation of about 4,000 feet. Considerable very recent weevil infestation. G. insignis under infected P. ponderosa showed weevil development. There were a few spots on each leaf, but not so abundant as on P. ponderosa.

Inspection No. 2: Okanogan County

Location: 5½ miles southeast of Disautels on road between Chesaw and Nespelem. Township 38N., R. 29 E., Section 22.

Inspectors: Putnam and Coy. September 17, 1927.

Pine situation: Possibility of P. albicaulis existing on high ridges 5 to 7 miles distant.

Mines inspected: 2 P. ponderosa. 3 G. insignis examined none found infected. 20 P. ponderosa examined, 1 found infected, 80% of leaves infected, 30% medium and 70% total production. It was evident that considerable weevil intensification had taken place since the rains, or within 2 weeks of time of examination.

P. Pend Oreille County. Pines are abundant and well distributed in the north and eastern part of the county.

a. Record of scouting performed. Table No. 9 shows the results of scouting in Pend Oreille County, classified according to association of host.

Table No. 9

Analysis of Scouting, Pend Oreille County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy No.Ribes	2	34	0	--	0	0	0	--	--	--
Pines Healthy	42	482	0	--	R.nigrum	1	0	--		
					R.pet.	50	0	--		
					G.iner.	79	0	--		
					R.visc.	453	0	--	1'-100'	?
Ribes Healthy					R.lac.	755	0	--		
					G.)Cult.					
					R.) Sp.	60	0	--		
	7	17	0	--	R.nigrum	2	0	--		
					R.pet.	10	0	--	101'-	
					G.iner.	23	0	--	300'	?
					R.lac.	142	0	--		
	1	0	0	--	R.nigrum	2	0	--	301'-500'	?
	2	6	0	--	G.iner.	25	0	--	501'-	
					R.lac.	55	0	--	1000'	?
Pines Healthy Ribes Infected	1	6	0	--	R.visc.	41	1	15	25'	?
No Pines	41	0	0	--	R.pet.	251	0	--		
					G.iner.	236	0	--		
					G.irrig.	1	0	--		
Ribes Healthy					R.visc.	414	0	--	?	?
					R.lac.	184	0	--		
					R.)Cult.					
					G.) Sp.	3	0	--		
Totals	96	547	0	--	R.nigrum	3	0	--		
					R.pet.	311	0	--		
					G.iner.	365	0	--		
					G.irrig.	1	0	--		
					R.visc.	908	1	--	?	?
					R.lac.	1,136	0	--		
					R.)Cult					
					G.) Sp.	63	0	--		
Grand Total						2,787	1	15		

Table No. 9

Analysis of Formations, Ford Oroville County, Washington

Formation	Lime Intersection				Ribbon Intersection				Distance from Ribbon to Outcrop	
	No. of Outcrops	Examination	Fossiliferous	Type	Prevalence	Arrangement	No. Infected	Leaves Infected	Infected	Leaves Infected
Lime Beds	2	34	0	--	0	3	0	--	--	--
Limestone Beds	42	452	0	--	1. Migrum 2. Bet. 3. Ter. 4. Vac. 5. Jac. 6. Calt. 7. Tu.	1 30 75 452 258 80	0 0 0 0 0 0	-- -- -- -- -- --	1'-10"	1
Ribbon Beds	7	17	0	--	1. Migrum 2. Tet. 3. Ter. 4. Jac.	3 12 72 14	0 0 0 0	-- -- -- --	1'-3"	1
Limestone	1	0	0	--	1. Migrum	1	0	--	2'-10"	1
Limestone Beds	2	8	0	--	1. Ter. 2. Jac.	120 85	0 0	-- --	3'-1" 10'0"	1
Lime Limestone Beds Ribbon (Layers)	1	0	3	--	1. Vac.	41	1	1.5	2'0"	1
Lime Beds	41	0	0	--	1. Tet. 2. Ter. 3. Pyrit. 4. Vac. 5. Jac. 6. Dol. 7. Ter.	1,200 886 1 414 184 3	0 0 0 0 0 0	-- -- -- -- -- --		
Limestone	78	347	1	--	1. Migrum 2. Tet. 3. Ter. 4. Pyrit. 5. Vac. 6. Jac. 7. Calt. 8. Tu.	1 1,312 820 1 838 1,178 1 84	0 0 0 0 1 0 0 0	-- -- -- -- -- -- -- --		
Total Beds	--	--	--	--	--	4,727	1	1.5	--	--

b. Details of Ribes infection. Only one Ribes infection point was found in Pend Oreille County. This is discussed in detail following.

Inspection Point: No. 93 Pend Oreille County.

Location: 10 miles west of Cusick on old road to Chewelah, Township 33 N., R. 42 E., Section 26.

Inspectors: Detwiler, Youden, Joy, Putnam; September 21, 1927.

Pine inspection: P. monticola found in mixture with Douglas fir 60 to 80 years old. A very few small pines along road right of way. Inspected 6 white pines, none found infected.

Ribes inspection: 41 R. viscosissimum examined along road. One found infected; 15% of leaves infected per infected bush. Infected surface bore 25% uredinia, 70% telia, 5% necrotic areas. Telial columns strong and vigorous. There were pines within 25 feet of infected bush. One small pine was found within 20 feet of infected bush.

Remarks: This finding of infection on R. viscosissimum so far from any known pine infection is an important discovery. There are two possible ways of explaining this infection. (1) It may have resulted from aecial infection some distance away, in which case it shows the capability of R. viscosissimum becoming infected from a distance. (2) It may be evidence showing that an undiscovered aecial source exists close at hand. It appears that the former explanation is the more logical, because the region surrounding this find was quite intensively scouted, and no other Ribes infection found nearer than 25 miles. If an aecial source existed in the vicinity, it was to be expected that other Ribes infection would have been found.

4. Spokane County

Only the northern portion of Spokane County was scouted. Mt. Spokane supports a good stand of white pines, associated with R. lacustre and R. viscosissimum. R. petiolare was found on Lake Eloika. This makes a good inspection point for periodic examination.

a. Record of scouting performed. Table No. 10 shows the results of scouting in Spokane County classified according to association of hosts.

b. Detail of Ribes infection. Only one Ribes infection point was found in Lead Oroville County. This is discussed in detail following.

Inspection Point: No. 93 Lead Oroville County

Location: 10 miles west of Custer on old road to Chewelah. Township 33 N., R. 42 E., Section 26.

Inspectors: Pettifer; Verdam, Loy, Putnam; September 21, 1927.

Pine inspection: P. monticola found in mixture with Douglas fir 80 to 90 years old. A very few small pines along road right of way. Inspected 6 white pines, none found infected.

Ribes inspection: 41 R. viscosissimum examined along road. One found infected; 1 of 3 leaves infected per infected bush. Infected surface bore 2% uredinia, 70% telia, 5% necrotic areas. Telial columns strong and vigorous. There were pines within 25 feet of infected bush. One small pine was found within 20 feet of infected bush.

Remarks: This finding of infection on R. viscosissimum so far from any known pine infection is an important discovery. There are two possible ways of explaining this infection. (1) It may have resulted from aecial infection some distance away, in which case it shows the capability of R. viscosissimum becoming infected from a distance. (2) It may be evidence showing that an undiscovered aecial source exists close at hand. It appears that the former explanation is the more logical, because the region surrounding this find was quite intensively scouted, and no other Ribes infection found nearer than 25 miles. If an aecial source existed in the vicinity, it was to be expected that other Ribes infection would have been found.

4. Spokane County:

Only the northern portion of Spokane County was scouted. Mt. Spokane supports a good stand of white pines, associated with R. lacustre and R. viscosissimum. R. petiolare was found on Lake Melissa. This marks a good inoculation point for ribicola eradication.

a. Record of scouting performed. Table No. 10 shows the results of scouting in Spokane County classified according to association of hosts.

Table No. 10

Analysis of Scouting, Spokane County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy Ribes Healthy	1	0	0	--	R.lac.	10	0	--	50'	
No Pines Ribes Healthy	1	0	0	--	R.pet.	200	0	--	?	?
					C.iner.	2	0	--		
Totals	2	0	0	--	R.pet.	200	0	--		
					C.iner.	2	0	--	?	?
					R.lac.	10	0	--		
Grand Total						212	0	--		

5. Stevens County

Stevens County was quite thoroughly scouted. Pines occur in the northern part and in scattered areas on the eastern portion.

a. Record of scouting performed. Table No. 11 shows the results of scouting in Stevens County classified according to association of hosts.

Table No. 11 shows that R. petiolare was found infected at two localities not associated with white pines.

b. Details of Ribes Infection. There is given following a detailed description of each of the two Ribes infections found in Stevens County:

Table No. 13

Analysis of Counties, Broome County, 1928-29

Insect-ation of Month	No. of Insect-ation Periods	Time Inspected Known-ingly	Time Inspected Inad-vert-ently	Time Inspected Canners per Infected Trees	Ribes Inspection No. Ribes Infected Trees	Ribes Inspection % Leaves Infected per Infected Bush	Distance From Ribes to Healthy Pines	Distance From Ribes to Infected Pines
Triangle	1	0	0	---	B.lac. 10	---	801	
Tioga	1	0	0	---	B.lac. 23 B.leav. 2	---	1	1
Total	2	0	0	---	B.lac. 23 B.leav. 2 B.lac. 12	---	1	1
				Grand Total	37	---		

4. Steuben County

Steuben County was quite thoroughly scouted. Pines occur in the northern part and in scattered areas on the eastern portion.

5. Amount of scouting required. Table No. 13 shows the results of scouting in Steuben County classified according to association of hosts.

Table No. 11

Analysis of Scouting, Stevens County, Washington

Association of Hosts	No. of Inspection Points	Pine Inspection: Examined	Pine Inspection: Infected	Pine Inspection: Cankers per Infected Tree	Ribes Inspection: Species	Ribes Inspection: No. Examined	Ribes Inspection: No. Infected	Ribes Inspection: % Leaves Infected per Infected Bush	Distance from Ribes to: Healthy Pines	Distance from Ribes to: Infected Pines
Pines Healthy	9	153	0	--	G.iner.	87	0	--		
					R.visc.	62	0	--	1'-100'	?
					R. lac.	162	0	--		
Ribes Healthy	3	52	0	--	R.nigrum	5	0	--		
					R.pet.	8	0	--		
					G.iner.	32	0	--	101'-	?
					R.lac.	1	0	--	300'	
					G.)Cult. R.) Sp.	5	0	--		
No Pines Ribes Healthy	45	0	0	--	R.nigrum	1	0	--		
					R.pet.	662	0	--		
					G.iner.	177	0	--		
					R.visc.	30	0	--	?	?
					R.lac.	532	0	--		
					R.aureum	37	0	--		
					R.)Cult. G.) Sp.	13	0	--		
No Pine Ribes Infected	1	0	0	--	R.pet.	105	3	10		
					G.iner.	4	0	--	?	?
					R.lac.	4	0	--		
	1	0	0	--	R. et.	85	1	99	?	?
Totals	59	205	0	--	R.nigrum	6	0	--		
					R.pet.	860	4	32		
					G.iner.	300	0	--		
					R.visc.	92	0	--		
					R.lac.	699	0	--	?	?
					R.aureum	37	0	--		
					G.)Cult R.) Sp.	18	0	--		
Grand Total						2,012	4	32		

Table No. 11 shows that R. petiolare was found infected at two localities not associated with white pines.

b. Details of Ribes infection. There is given following a detailed description of each of the two Ribes infections found in Stevens County:

Table No. 11

Analysis of Counties, Eleven Counties, Tennessee

Counties	No. of Infected Townships	Township Area Infected	Township Area Uninfected	Infected Township Area	Uninfected Township Area	Distance from Nearest Infected Township
Obion	9	138	0	--	--	--
Gibson	3	62	0	--	--	--
Weakley						
Lake						
Dyer						
Fayette						
Shelby						
Tipton						
Haywood						
Crockett						
Madison						
Carroll						
Henderson						
Chester						
Hardeman						
McNairy						
Hardin						
Wayne						
Lauderdale						
Grand Total						

Table No. 11 shows that R. petiolare was found infected at two localities not associated with white pines.

b. Details of Ribes infection. There is given following a detailed description of each of the two Ribes infections found in Stevens County:

Name: Mill Creek Infection. Inspection No. 9

Location: On Mill Creek, 6 miles northeast of Colville on road to Alladin. Township 36N., R. 39 E., Section 25.

Inspectors: Training crew. September 10, 1927.

Situation: Along swampy creek. No pines known for 10 miles.

Ribes inspection: 4 G.inermis, 4 R. lacustre examined. None found infected. 105 R. petiolare examined, 3 infected. 10% of leaves infected per infected bush. Infected surface bearing 1% uredinia, 99% telia.

Remarks: This infection point found on first day of scouting when new men were being trained.

Inspection No. 19: Stevens County

Location: About 6 miles southeast of Colville, Wash. 2 miles southeast of White Mud Lake on McDonald Road. Township 35 N., R. 40 E., Section 20.

Inspectors: Hornibrook and Lindh. September 14, 1927.

Pine situation: No white pines known for several miles.

Ribes inspection: Examined 85 R. petiolare, 1 infected. 99% of leaves infected per infected bush. Practically 100% telial production. Infected bush partly defoliated. Leaves on ground heavily infected.

D. Results of Scouting in Southeastern British Columbia

a. Record of scouting performed. Scouting by the Office of Blister Rust Control in British Columbia was limited to that portion of the Province lying close to the northern border of eastern Washington, Idaho and western Montana. The results listed in this report include those of scouting in September and also a 2-day trip made in the vicinity of Nelson, B. C. in early July for the purpose of familiarizing Federal reconnaissance crew leaders with the appearance of the rust in the field.

Table No. 12 gives the results of scouting in southeastern British Columbia classified according to association of hosts.

Name: Mill Creek Infection. Inspection No. 9

Location: On Mill Creek, 6 miles northeast of Colville on road to Addia. Township 38N., R. 39 E., Section 28.

Inspectors: Training crew, September 10, 1927.

Situation: Along swampy creek. No pines known for 10 miles.

Blue infection: 4 plants, 4 I. laxiflora examined. None found infected. 105 R. petiolare examined, 3 infected. 10% of leaves infected per infected bush. Infected surface bearing 1% uredinia, 99% telia.

Remarks: This infection point found on first day of scouting when new men were being trained.

Inspection No. 19: Stevens County

Location: About 6 miles southeast of Colville, Wash. 3 miles southeast of White Mud Lake on McDonald Road. Township 36 N., R. 40 E., Section 20.

Inspectors: Wormbrook and Black. September 14, 1927.

Pine situation: No white pines known for several miles.

Ribes inspection: Examined 85 R. petiolare, 1 infected. 99% of leaves infected per infected bush. Practically 100% lethal production. Infected bush partly defoliated. Leaves on ground heavily infected.

7. Records of scouting in Southeastern Kootenai British Columbia

a. Record of scouting performed. Scouting by the Office of Blister Rust Control in British Columbia was limited to that portion of the Province lying close to the northern border of eastern Washington, Idaho and western Montana. The results listed in this report include those of scouting in September and also a 3-day trip made in the vicinity of Nelson, B. C. in early July for the purpose of familiarizing Federal reconnaissance crew leaders with the appearance of the rust in the field.

Table No. 12 gives the results of scouting in southeastern British Columbia classified according to association of hosts.

Table No. 12

Analysis of Scouting, British Columbia

Association of Hosts	In the case of points at two No. of Inspection Points	Pine Inspection Examined	Infected	Cankers per Infected Tree	Ribes Inspection Species	No. Examined	No. Infected	% Leaves Infected per Infected Bush	Distance from Ribes to Healthy Pines	Distance from Ribes to Infected Pines
Pines Healthy Ribes Healthy	9	32	0	--	R.nigrum	520	0	--	1'-100'	?
					R.)Cult.					
					O.) Sp.	66	0	--		
	3	0	0	--	R.nigrum	59	0	--	101'-300'	?
					R.)Cult.					
					O.) Sp.	10	0	--		
	2	0	0	--	R.nigrum	46	0	--	301-500'	?
	1	0	0	--	R.nigrum	15	0	--	1000'+	
Pines Infected Ribes Inf.	1	0	0	--	R.nigrum	2	3	2%	50'	300'
					R.)Cult.					
					O.) Sp.	1	1	.5%	50'	300'
Pines Healthy Ribes Inf.	1	1	0	--	R.nigrum	58	1	3%	300'	?
No Pines Ribes Infected	1	0	0	--	R.nigrum	7	2	.5%	?	?
	1	0	0	--	R.nigrum	50	5	15%	?	?
					R.)Cult.					
					O.) Sp.	8	1	3%		
	1	0	0	--	R.nigrum	30	4	7%	?	?
	1	0	0	--	R.nigrum	12	3	15		
					R.)Cult.					
					O.) Sp.	13	0	--	?	?
	1	0	0	--	R.nigrum	60	4	3%		?
					R.)Cult.					
					O.) Sp.	79	0	--		
	1	0	0	--	R.nigrum	50	1	1%	?	?
No Pines Ribes Healthy	61	0	0	--	R.nigrum	1,189	0	--		
					G.iner.	39	0	--		
					R.visc.	2	0	--	?	?
					R.lac.	3	0	--		
					R)Cult.					
					G) Sp.	915	0	--		
Totals	84	33	0	--	R.nigrum	2,098	22	6%		
					G.iner.	39	0	--		
					R.visc.	2	0	--		
					R.lac.	3	0	--	?	?
					R.)Cult.					
					G.) Sp.	1,102	2	1%		
Grand Total						3,244	34	5%		

Prevalence of Intestinal Parasite Infections

Parasite Species	No. of Cases Examined	Cases Positive	Percentage Positive	Light Infection	Moderate Infection	Heavy Infection
Ascaris lumbricoides	1,240	312	25.2	198	87	27
Trichuris trichiura	1,240	189	15.2	142	39	8
Hookworm (Necator americanus)	1,240	274	22.1	201	58	15
Strongyloides stercoralis	1,240	47	3.8	41	5	1
Enterobius vermicularis	1,240	96	7.7	88	7	1
Hymenolepis nana	1,240	23	1.9	21	2	0
Taenia spp.	1,240	14	1.1	12	2	0
Entamoeba coli	1,240	158	12.7	149	9	0
Entamoeba histolytica	1,240	31	2.5	27	4	0
Giardia lamblia	1,240	62	5.0	58	4	0
Iodamoeba bütschlii	1,240	9	0.7	9	0	0
Endolimax nana	1,240	71	5.7	68	3	0
Blastocystis hominis	1,240	44	3.5	41	3	0
Chilomastix mesnili	1,240	6	0.5	6	0	0
Dientamoeba fragilis	1,240	3	0.2	3	0	0
Cryptosporidium sp.	1,240	11	0.9	9	2	0
Cyclospora cayetanensis	1,240	2	0.2	2	0	0
Isospora belli	1,240	1	0.1	1	0	0
Microsporidia	1,240	4	0.3	3	1	0
Cystoisospora spp.	1,240	1	0.1	1	0	0
Sarcocystis hominis	1,240	1	0.1	1	0	0
Toxoplasma gondii	1,240	0	0.0	0	0	0
Balantidium coli	1,240	2	0.2	2	0	0
Blastocystis hominis	1,240	44	3.5	41	3	0
Entamoeba histolytica	1,240	31	2.5	27	4	0
Giardia lamblia	1,240	62	5.0	58	4	0
Ascaris lumbricoides	1,240	312	25.2	198	87	27
Trichuris trichiura	1,240	189	15.2	142	39	8
Hookworm (Necator americanus)	1,240	274	22.1	201	58	15
Strongyloides stercoralis	1,240	47	3.8	41	5	1
Enterobius vermicularis	1,240	96	7.7	88	7	1
Hymenolepis nana	1,240	23	1.9	21	2	0
Taenia spp.	1,240	14	1.1	12	2	0
Entamoeba coli	1,240	158	12.7	149	9	0
Entamoeba histolytica	1,240	31	2.5	27	4	0
Giardia lamblia	1,240	62	5.0	58	4	0
Iodamoeba bütschlii	1,240	9	0.7	9	0	0
Endolimax nana	1,240	71	5.7	68	3	0
Blastocystis hominis	1,240	44	3.5	41	3	0
Chilomastix mesnili	1,240	6	0.5	6	0	0
Dientamoeba fragilis	1,240	3	0.2	3	0	0
Cryptosporidium sp.	1,240	11	0.9	9	2	0
Cyclospora cayetanensis	1,240	2	0.2	2	0	0
Isospora belli	1,240	1	0.1	1	0	0
Microsporidia	1,240	4	0.3	3	1	0
Cystoisospora spp.	1,240	1	0.1	1	0	0
Sarcocystis hominis	1,240	1	0.1	1	0	0
Toxoplasma gondii	1,240	0	0.0	0	0	0
Balantidium coli	1,240	2	0.2	2	0	0
Grand Total	1,240	1,844	148.7	1,502	312	54

It is evident from Table No. 12 that only R. nigrum and cultivated red currants were found infected in southeastern British Columbia. In the case of cultivated red currants, they were found infected only at two points, in direct association with infected R. nigrum.

E. Ribes Infections Found in Interior Section of British Columbia by Office of Forest Pathology, 1927

Table No. 13 gives in summary form the Ribes infections found in the interior section of British Columbia, 1927.

Table No. 13

Summary of Ribes Infections Found by Office of Forest Pathology in Interior Section of British Columbia, 1927

Ribes Species	Infection Points	Number Examined	Number Infected	% Bushes Infected
R. nigrum	49	1,874	1,297	69.2
R. (petiolare (hudsonianum	16	901	55	6.1
G. (inermis (irrigua	28	706	70	9.9
R. aureum	1	13	5	38.4
R. sanguineum	1	60	13	21.6
R. viscosissimum	2	68	26	38.3
R. lacustre	7	186	57	30.6
R. vulgare	12	242	77	31.8
Total(from orig.)	*90	4,040	1,600	39.6

*There were actually only 90 infection points found, although the total in column 2 adds up to 116. The discrepancy is due to the fact that at several points two or more Ribes species were found infected at the same location.

The northernmost Ribes infection found was at Summit Lake approximately 375 miles north of the International Boundary, where one R. hudsonianum was found infected, out of 24 examined.

F. Discovery of an Unknown Rust on Ribes

It is evident from Table No. 12 that only R. nigrum and cultivated red currants were found infected in southeastern British Columbia. In the case of cultivated red currants, they were found infected only at two points, in direct association with infected R. nigrum.

3. Ribes Infections Found in Interior Section of British Columbia by Officers of Forest Pathology, 1927

Table No. 13 gives in summary form the Ribes infections found in the interior section of British Columbia, 1927.

Table No. 13

Summary of Ribes Infections Found by Offices of Forest Pathology in Interior Section of British Columbia, 1927

Ribes Species	Infections Points	Number Examined	Number Infected	% Bushes Infected
R. nigrum	42	1,774	1,297	73.1
R. (Ribesia) petiolare (Grossularia)	10	901	55	5.1
R. (Grossularia) (Berisia) irriguum	25	708	72	9.8
R. acerum	1	32	5	15.4
R. oxyacanthoides	1	80	14	17.5
R. viscosissimum	2	90	24	26.6
R. lacustre	7	183	47	25.4
R. vulgare	11	342	77	22.5
Total (from table)	*70	4,040	1,577	39.0

*There were actually only 70 infection points found, although the total in column 2 adds up to 116. The discrepancy is due to the fact that at several points two or more Ribes species were found infected at the same location.

The northernmost Ribes infection found was at Summit Lake approximately 375 miles north of the International Boundary, where one R. hudsonianum was found infected, out of 24 examined.

F. Discovery of an Unknown Rust on Ribes

During the scouting in northeastern Washington, a rust was found on R. viscosissimum and G. inermis somewhat resembling the uredinial stage of blister rust, although more granular in appearance. These spots were found singly or very scattered on one or few leaves on very occasional bushes. All specimens found were sent in to Washington, D. C. for identification. The identity of this rust has not been determined.

Table No. 14 shows the locations where this rust was found.

Table No. 14

Record of Locations in Washington where an Unknown Rust on Ribes was found in September, 1927

County	Location	T	R	S	Ribes Species	Bushes Examined	Bushes Infected	Total Leaves Infected	Remarks
1. Stevens County	13 mi. from Ione on Big Muddy Cr. Road	33N	41E	33	R.visc. R.lac.	21 10	2 0	2(1 each) 0	Young pine (0-10 years) within 25'
2. Pend Oreille County	7.8 mi. from Ione on Big Muddy Cr. Road	37N	42E	5	R.visc. R.lac.	70 2	7 0	15 (1-3 ea.) 0	Infected bushes within 10' of road. Poplar nearby heavily hit. Pine (20-40 yr.) within 20'
3. Pend Oreille Co.	7½ mi. W. Usk	32N	43E	5	R.visc	14	1	1	
4. Pend Oreille County	Air line-- 2 mi. S.W. of Ione By road-- 4 mi. S.W. of Ione	37N	42E	SE¼ 11	R.visc. R.lac.	31 1	2 0	2 0	R.visc. semi-abundant, north exposure. Located in an old burn. Heavy defoliation has taken place on R.visc.
5. Pend Oreille County	3 miles west of Blueslide Washington	36N	43E	SW¼ 8	G.iner.	1	1	1	one extra-large pustule only.

County	Location				Number Obser-ved	Number Inva-ded	Total Leaves Infected	Remarks
1. Nieuwer County.	1.5 mi. from Zone on Big Muddy Creek Road	SEW	NEW	NE	3 trees. 10 trees.	3 0	8(1 seed) 7	Young pine (0-10 years) within 25'
2. Iead Oreille County	7.5 mi. from Zone on Big Muddy Creek Road	NEW	NEW	S	5 trees. 5 trees.	5 (1-3 ea.) 0	15	Infected bush es within 10' of road. Popla nearby heavil bit. Pine(20-4 ft.) within 20
3. Iead Oreille County	7½ mi. from Zone	SEW	NEW	S	4 trees	1	1	
4. Iead Oreille County	Air line-- 7 mi. S.E. of Zone By road-- 9 mi. S.E. of Zone	SEW	SEW	SEW	11 11	3 0	3 0	B.visc. seml- abundant, mort exposure. loca ted in an old burn. Heavy de foliation has taken place o B.visc.
5. Iead Oreille County	3 miles east of Priestly Prairie	SEW	NEW	SW	1 trees	1	1	One extra- large pustule only.

IV. Costs of Scouting

Table No. 15 shows the costs of scouting by regions.

Table No. 15

Costs of Scouting for Blister Rust by Regions Scouted in Inland Empire exclusive of Montana, September and October, 1927

State or Province	Man Days	Salaries	Subsistence	Transportation		Miscellaneous	Grand Total
				Personal Auto @ 7¢ per mile	Other Travel		
N. Idaho	138	$ 512.17	$354.81	$ 268.66	$46.98	$ 1.50	$1,184.02
N.E.Wash.	117	532.00	274.72	389.98	22.19	5.53	1,184.44
S.E British Columbia	20	88.33	76.75	72.17	2.70	5.00	244.95
Total	275	$1,132.50	$706.28	$670.81	$71.77	$12.05	$2,593.41

The cost of scouting per man day = $\frac{\$2,593.41}{275}$ = $9.43

Average salary = $\frac{\$1,132.50}{275}$ = $4.12 per day, or $123.60 per month.

Average daily subsistence = $\frac{\$706.28}{275}$ = $2.57

V. Summary

A. Summary by Association of Hosts

Table No. 16 shows the results of all scouting performed, classified according to association of hosts.

IV. Costs of Touring

Table No. 16 shows the costs of touring by regions.

Table No. 16

Costs of Touring for Minstrel Band by Regions Covered in United States exclusive of Montana, Territories and Dependencies

State or Province	Man Days	Salaries	Subsistence	Transportation: Personal Auto	Transportation: Other	Miscellaneous	Grand Total
N. Idaho	139	$ 812.17	$ 834.84	$ 806.64	$ 14.00	$ 1.00	$ 1,784.05
N.W. Wash.	117	682.00	574.72	587.98	10.19	1.00	1,164.44
S.E. British Columbia	20	88.33	74.74	72.17	5.71	3.00	241.07
Total	276	$1,582.50	$1706.30	$1472.79	$31.90	$13.00	$3,293.41

The cost of touring per man day = $\frac{\$3,293.41}{276}$ = $11.93

Average salary = $\frac{\$1,132.50}{276}$ = $4.12 per day, or $123.60 per month.

Average daily subsistence = $\frac{\$706.30}{276}$ = $2.57

V. Summary

A. Summary by Association of Posts

Table No. 18 shows the results of all touring performed, classified according to association of posts.

Table No. 16

Total Scouting Performed Summer, 1927 Northern Idaho, Northeastern Washington, and Adjacent British Columbia, Classified According to Association of Hosts

Association of Hosts	No. of Inspection Points	Pine Inspection				Ribes Inspection			
		Species	Number Examined	Number Infected	Cankers per Infected Tree	Species	Number Examined	Number Infected	Leaves Infected per Infected Bush
Pines Healthy No Ribes	3	P.mont.	109	0	0	0	0	0	0
Pines Healthy	215	P.mont.	1033	0	0	R.nigrum	657	0	0
						R.petiolare	1,364	0	0
						G.inermis	625	0	0
Ribes Healthy						G.irrigua	114	0	0
						R.visci.	1,748	0	0
						R.lacustre	2,886	0	0
						Cult.red currant & goose	192	0	0
						Total	7,586	0	0
Pines Healthy	2	P.mont.	13	0	0	R.nigrum	58	1	2%
Ribes Infected						G.inermis	6	2	7%
						Total	64	3	5%
Pines Inf.	1	P.mont.	Pine Infection known previously			R.nigrum	2	2	2%
Ribes Inf.						Cult.red currant & goose	1	1	0.5%
						Total	3	3	1.5%
No Pines	214	--	0	0	0	R.nigrum	1,208	0	--
						R.petiolare	1,341	0	--
						G.inermis	592	0	--
Ribes Healthy						G.irrigua	16	0	--
						R.visco.	773	0	--
						R.lacustre	1,538	0	--
						R.aureum	37	0	--
						Cult.species	973	0	--
						Total	6,478	0	--
No Pines	15	--	0	0	0	R.nigrum	209	19	6.3%
						R.petiolare	324	15	41.3%
Ribes Inf.						G.inermis	35	6	8.7%
						R.lacustre	33	0	0
						Cult.species	110	1	2%
						Total	711	41	19.7%

B. Summary by Regions

Table No. 17 shows the results of scouting classified by regions.

Table No. 17

Total Counties Infected and Number of Days Spent in the Various Districts by Lieut. Percy Hutton Chaplin, Superintendent of Entomology, and Assistant Entomologist of Texas

Assignation of Points	No. of Counties Visited	Time Inspection: Number of Days Spent			Miles Traveled: Number		
			Number of Counties Infected			Number Infected	% Leaves Infected per Exam.
Zones	0	0	0	0	0	0	0
Zones	215	1003	0	0	0	0	0
Zones	3	13	0	0	1	1	3
Zones	1	1	1	1	2	2	21
No	214	--	0	0	--	--	--
Zones	0	--	0	0	--	--	--

Table No. 17 shows the results of scouting classified by regions.

Table No. 17

Summary of Scouting in the Inland Empire and British Columbia, Classified by Counties
Summer, 1927

Counties	Inspection Points					RIBES INSPECTED																		Pine Inspected	
	Healthy	Pines Infec-ted	Ribes Infec-ted	Both Infec-ted	Total	R. nigrum		R.petiolare		G.inermis		G.irrigua		R.viscosissimum		R.lacustre		R. aureum		Cult. species		Total Ribes		Exam-ined	Inf.
						Exam.	Inf.	Exam.	Inf.	Exam.	Inf.	Exam.	Inf.	Examined	Infec.	Exam.	Inf.	Exam.	Inf.	Examined	Inf.	Exam.	Inf.		
Idaho																									
Benewah	9	0	0	0	9	0	0	276	0	28	0	2	0	89	0	4	0	0	0	0	0	399	0	32	0
Bonner	72	0	1	0	73	7	0	0	0	261	2	2	0	621	0	965	0	0	0	65	0	1,921	2	80	0
Boundary	39	0	0	0	39	18	0	0	0	39	0	0	0	35	0	327	0	0	0	23	0	442	0	51	0
Kootenai	35	0	0	0	35	0	0	0	0	72	0	0	0	706	0	476	0	0	0	3	0	869	0	70	0
Shoshone	24	0	0	0	24	0	0	1,020	0	69	0	125	0	408	0	505	0	0	0	0	0	2,127	0	32	0
Washington																									
Ferry	20	0	5	0	25	0	0	283	3	64	4	0	0	60	0	328	0	0	0	2	0	737	7	75	0
Okanogan	2	0	2	0	4	0	0	79	8	21	2	0	0	0	0	2	0	0	0	0	0	102	10	0	0
Pend Oreille	96	0	0	0	96	3	0	311	0	365	0	1	0	908	0	1,136	0	0	0	63	0	2,787	0	547	0
Spokane	2	0	0	0	2	0	0	200	0	2	0	0	0	0	0	10	0	0	0	0	0	212	0	0	0
Stevens	57	0	2	0	59	6	0	660	4	300	0	0	0	92	0	699	0	37	0	18	0	2,012	4	206	0
British Columbia	76	0	7	1	84	2,096	22	0	0	39	0	0	0	2	0	3	0	0	0	1,102	2	3,244	28	33	0
Totals	432	0	17	1	450	2,132	22	3,029	15	1,260	8	130	0	2,521	0	4,457	0	37	0	1,276	2	14,868	47	1,125	0

1927 Annual Report
H. N. Putnam

No pine infection was found in Idaho or northeastern Washington. No pine infection in British Columbia was found not previously known to exist.

Ribes infection was found at one location in Bonner County, Idaho, on G.inermis.

Ribes infection was found in northeastern Washington at five points in Ferry County; at two points in Okanogan County; and at two points in Stevens County. Infection in northeastern Washington was found at seven points on R. petiolare; at three points on G. inermis; and at one point on R. viscosissimum.

In British Columbia adjacent to eastern Washington Ribes infection was found at eight points on R. nigrum, and at two of these points on cultivated red currants.

VI. Conclusion

The season of 1927 was particularly favorable for the spread of the rust. The disease was found at several points on Ribes near pines, and doubtless existed at many other localities on Ribes associated with pines. It is to be expected that at several of such points, infection will enter the pines, and within two years infected pines should be located which became infected in 1927.

No pine infection was found in Idaho or northeastern Washington. No pine infection in British Columbia was found not previously known to exist.

Ribes infection was found at one location in Bonner County, Idaho, on G. inermis.

Ribes infection was found in northeastern Washington at five points in Perry County; at two points in Okanogan County; and at two points in Stevens County. Infection in northeastern Washington was found at seven points on R. petiolare; at three points on G. inermis; and at one point on R. viscosissimum.

In British Columbia adjacent to eastern Washington Ribes infection was found at eight points on R. nigrum, and at two of these points on cultivated red currants.

VI. Conclusion

The season of 1927 was particularly favorable for the spread of the rust. The disease was found at several points on Ribes near pines, and doubtless existed at many other localities on Ribes associated with pines. It is to be expected that at several of such points, infection will enter the pines, and within two years infected pines should be located which became infected in 1927.

BLISTER RUST CONTROL WORK IN OREGON
1927

The following is the memorandum of understanding under the terms of which the work in Oregon is organized:

MEMORANDUM OF UNDERSTANDING
between
THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and the
OREGON STATE BOARD OF HORTICULTURE - - OREGON STATE BOARD OF FORESTRY - - AND THE OREGON AGRICULTURAL COLLEGE
relative to
Cooperative White Pine Blister Rust Control Work in Oregon.

Effective July 1, 1927.

---------oOo----------

A. THE BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;
(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;
(3) Inspect plant shipments to supplement blister rust quarantines;
(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and
(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. THE OREGON STATE BOARD OF HORTICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;
(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease; and
(3) Undertake such destruction of white pine or Ribes in Oregon and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work

C. THE OREGON STATE BOARD OF FORESTRY agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, scouting for white pine blister rust and assisting the other cooperating agencies in carrying out the activities enumerated herein.

1927

The following is the memorandum of understanding under the terms of which the work in Oregon is organized:

MEMORANDUM OF UNDERSTANDING
between
THE SECRETARY OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and the
OREGON PLANT BOARD OF AGRICULTURE - - BUREAU STATE BOARD OF HORTICULTURE
AGENCIES - - FOR THE CONTROL AND ERADICATION OF DISEASES
relative to
Cooperative White Pine Blister Rust Control Work in Oregon.
Effective July 1, 1927.

---oo---

A. THE BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. THE OREGON STATE BOARD OF HORTICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, according for white pine blister rust and inspecting nurseries for this disease; and

(3) Undertake such destruction of white pine or Ribes in Oregon and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work

C. THE OREGON STATE BOARD OF FORESTRY agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, according for white pine blister rust and assisting the other cooperating agencies in carrying out the activities enumerated herein.

D. THE OREGON AGRICULTURAL COLLEGE agrees to:

(1) Examine all specimens suspected of being infected with the rust sent in by the field scouts and others and keep necessary records of such collections;

(2) Assist the Bureau of Plant Industry, through the College Extension Service, so far as practicable in educational activities necessary to the effective conduct of the work;

(3) Furnish the state leader in charge of blister rust control work in Oregon such office space as is necessary for properly conducting his work.

E. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated by either party by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in Oregon;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticised by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for host plants destroyed in control work;

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $16,000 to the support of the cooperative work, and the Oregon State Board of Horticulture approximately $14,250, the Oregon State Board of Forestry approximately $7,000, and the Oregon Agricultural College shall contribute in value approximately $1,500; thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:	Signature:
July 13, 1927	(s.) Chas. A. Park President, Oregon State Board of Horticulture.
July 13, 1927	(s.) F. A. Elliott State Forester, Oregon State Board of Forestry.
July 13, 1927	(s.) S. M. Zeller Plant Pathologist, Oregon Agricultural College.
Aug. 5, 1927	(s.) K. F. Kellerman Chief, Bureau of Plant Industry.

upon by supplemental correspondence.

Date:

(s.) [illegible]

President, Oregon State Board of Horticulture.

June 12, 1927

(s.) T. A. Hilgert

State Forester, Oregon State Board of Forestry.

May 17, 1927

(s.) S. M. Keller

Plant Pathologist, Oregon Agricultural College.

Aug. 6, 1927

(s.) E. P. Gaines

Chief, Bureau of Plant Industry.

BLISTER RUST CONTROL IN OREGON, 1927

By

L. N. Goodding

Associate Pathologist

The blister rust work in Oregon is both Federal and state. The Blister Rust Office of the Bureau of Plant Industry maintains an office in Room 234 Agriculture Hall, Oregon State College, Corvallis, Oregon. The chief agencies cooperating with the Bureau of Plant Industry are the State Board of Horticulture, with headquarters in the Fitzpatrick Building, Portland; the State Board of Forestry with headquarters in the Capitol Building, Salem, and the Oregon State College at Corvallis, Oregon. The United States Forest Service under agreement with the Western Blister Rust Office at Spokane is also a cooperating agent. Besides these are other agencies, such as lumber companies, the public schools, and many private citizens throughout the state.

The following report covers work done chiefly by the Office of Blister Rust Control, Bureau of Plant Industry.

Educational Work

A trip was taken in January to southern Oregon. Fire Wardens, County Fruit Inspectors, County Agents and teachers were interviewed on blister rust subjects. Blister rust talks illustrated by lantern slides were given in Roseburg and Ashland to high school students. Illustrated talks were also given to botany classes at the Oregon State College, February 7 and 9, and to the Biology Club, an organization consisting of members of the faculty from the Botany, Bacteriology, Zoology and Entomology departments of Oregon State College, and some of the Corvallis city physicians, on February 15. Other educational work consisted in an address to the Fire Wardens in Salem in May, delivered by E. M. Hornibrook, in the absence of Mr. Goodding, and in interviews with County Agents and Fruit Inspectors during the quarantine season, both spring and fall.

For use in connection with letters of inquiry received, for the letters to Fire Wardens and for the use of scouts and others, a new set of questions and answers was prepared.

During the year 270 letters were received and 750 sent out, including those sent to Fire Wardens. Of the 270 received, about 25 letters were requests for special information which was supplied.

Including the sets of "Questions and Answers" sent to Fire Wardens, and those distributed by Nursery Inspectors, and those sent in reply to requests for information, about 750 copies were used.

FIRE DUST CONTROL IN OREGON, 1927

By

L.R. Gooding

Associate Pathologist

The Blister Rust work in Oregon is both Federal and State. The Blister Rust Office of the Bureau of Plant Industry maintains an office in Room 324 Agricultural Hall, Oregon State College, Corvallis, Oregon. The chief cooperation cooperating with the Bureau of Plant Industry are the State Board of Horticulture, with headquarters in the Capitol Building, Portland; the State Board of Forestry with headquarters at Corvallis, Oregon. The United States Forest Service under agreement with the Western Blister Rust Office at Spokane is also a cooperating agent. Besides these are other agencies, such as lumber companies, the public schools, and many private citizens throughout the state.

The following report covers work done chiefly by the Office of Blister Rust Control, Bureau of Plant Industry.

Educational Work

A trip was taken in January to southern Oregon. Fire Wardens, County Fruit Inspectors, County Agents and teachers were interviewed on blister rust subjects. Blister rust talks illustrated by lantern slides were given in Roseburg and Ashland to high school students. Illustrated talks were also given to botany classes at the Oregon State College, February 7 and 8, and to the Biology Club, an organization consisting of members of the faculty from the Botany, Bacteriology, Zoology and Entomology departments of Oregon State College, and some of the Corvallis city physicians, on February 13. Other educational work consisted in an address to the Fire Wardens in Salem in May, delivered by E. M. Hornibrook, in the absence of Mr. Gooding, and in interviews with County Agents and Fruit Inspectors during the quarantine season both spring and fall.

Not use in connection with letters of inquiry received, for blue letters to Fire Wardens and for the use of scouts and others, a new set of questions and answers was prepared.

During the year 279 letters were received and 750 sent out, including those sent to Fire Wardens. Of the 270 received, about 35 letters were requests for special information which was supplied.

Including the sets of "Questions and Answers" sent to Fire Wardens, and those distributed by Nursery Inspectors, and those sent in reply to requests for information, about 750 copies were used.

Nursery and Quarantine Inspection

The quarantine inspection in the spring started off with the usual attempt to stop the importation of red flowering currants from Washington, as well as to check up on the shipments of nursery stock carrying quarantine violations. The state is to be commended on its efforts to cooperate with our office on the bridge work. Practically all of this work was done by the state officials, signs were posted on both approaches to the bridge and men at advantageous positions to intercept cars carrying currant bushes. The bridges in Hood River county were cared for by the toll collectors who were deputized by the County Fruit Inspector to intercept and destroy red flowering currants. The state did not supply definite data on the number of violations intercepted, but it amounted to about 100 on one Sunday. As the blister rust has spread to many points in Oregon, the state considers that a further attempt to intercept red flowering currants will be a waste of money.

Nursery inspection was carried on during the spring and fall in the quarantined regions of Oregon. A check was also made of all nurseries throughout the state.

The summary of this check is given in the following table.

TABLE NO. 1

Classification of Nursery	Number of Nurseries	Number of Ribes	Number of Pines	Number of Inspection Its.
With Ribes Only	33	73,439	0	17
With Pines Only	3	0	105	6
With Ribes and Pines	2	61	17	0
Neither Ribes Nor Pines	129	0	0	37
Totals	166	73,500	122	60

To the best of my knowledge only five nurseries, viz., the Orenco, Carlton, Lafayette, Homer Brixey and Brooks Nurseries, made application for permits to ship currants and gooseberries. All of these are in the old quarantine zone. Most of the nurseries in the newly quarantine portions of the state have discontinued or expect to discontinue the sale of currants and gooseberries.

The usual quarantine regulations were maintained at Portland and Pendleton. The results of their work is reported elsewhere, but not in the Oregon report.

Nursery and Quarantine Inspection

The quarantine inspection in the spring started off with the usual attempt to stop the importation of red flowering currants from Washington, as well as to check up on the shipments of nursery stock carrying quarantine violations. The state is to be commended on its efforts to cooperate with our office on the bridge work. Practically all of this work was done by the state officials, since were posted on both approaches to the bridge and men at advantageous positions to intercept cars carrying currant bushes. The bridges in Hood River county were cared for by the toll collectors who were deputized by the County Fruit Inspector to intercept and destroy red flowering currants. The state did not supply definite data on the number of violations intercepted, but it amounted to about 100 on one Sunday. As the blister rust has spread to many points in Oregon, the state considers that a further attempt to intercept red flowering currants will be a waste of money.

Nursery inspection was carried on during the spring and fall in the quarantined regions of Oregon. A check was also made of all nurseries throughout the state.

The summary of this check is given in the following table.

TABLE NO. 1

Classification of Nursery	Number of Inspections	Number of Miles	Number of Trees	Number of Inspections Rejected
Rich Nurse Only	36	74,429	0	17
Rich Nurse Only	3	0	109	3
Rich Nurse and Pines	4	91	17	0
Rather Nurse Our Pines	139	0	0	37
Totals	182	74,520	126	57

To the best of my knowledge only five nurseries, viz., the Oregon, Carlton, Lafayette, Hom r Briney and Brooks Nurseries, made application for permits to ship currants and gooseberries. All of these are in the old quarantine zone. Most of the nurseries in the newly quarantine portions of the state have discontinued or expect to discontinue the sale of currants and gooseberries.

The usual quarantine regulations were maintained at Portland and Pendleton. The results of their work is reported elsewhere, but not in the Oregon report.

In the course of the nursery inspection, establishment of inspection points, and inspection for blister rust, some plantings of cultivated black currants were located. The following table gives the results of this work:

TABLE NO. 2

County	Plantings	Old Bushes	Cuttings	Seedlings	Total Bushes
Benton	7	36	29		65
Columbia	1	1			1
Coos	2	11			11
Multnomah	4	38		500	538
Totals For State	14	86	29	500	615

Ecology-Eradication Projects

1. General Discussion

Unlike the work in the Idaho situation where there are immense stands of white pine awaiting the saw, and likewise the protection necessary to save them from future inroads of blister rust, the situation in Oregon is uncertain. No large commercial stands of western white pine exist, and the sugar pine stands, while extensive and valuable, seem remote from attack by blister rust. Also when compared with California, Oregon's sugar pine resources are not great. If Oregon were not a buffer state, it would not be entitled to so much consideration. There are many important reasons, however, for undertaking extensive work in Oregon;

(1) Until such time as we abandon all ideas of preventing the spread of blister rust artificially, we must apply quarantine measures, and if possible, prevent local and general intensification of the disease for the protection of Idaho and California.

(2) Oregon offers a set of conditions which may affect vitally the blister rust situation in the west, conditions of which we are partially or utterly ignorant. Let me briefly state a few of these.

a. As we go south, our first stands of sugar pine occur in southern Oregon, and we have only meager knowledge based on the reaction of this species to blister rust entirely outside its natural range and away from its natural conditions from which to predict the results when once the disease reaches southern Oregon.

b. Our coast wild black currant, Ribes bracteosum, has been

In the course of the nursery inspection, establishment of inspection points, and inspection for blister rust, some plantings of cultivated black currants were located. The following table gives results of this work:

TABLE NO. 4

County	Plantings	Old Bushes	Orchard	Seedlings	Total Bushes
Benton	7	60	25		85
Clackamas	1	1			1
Coos	2	11			11
Multnomah	4	4		300	304
Totals for State	14	76	25	300	315

Basic Considerations Involved

I. General Discussion

Unlike the work in the Idaho situation where there are immense stands of white pine awaiting the saw, and likewise the protection necessary to save them from future inroads of blister rust, the situation in Oregon is uncertain. No large commercial stands of western white pine exist, and the sugar pine stands, while extensive and valuable, seem remote from attack by blister rust. Also when compared with California, Oregon's sugar pine resources are not great. If Oregon were not a buffer state, it would not be entitled to so much consideration. There are many important reasons, however, for undertaking extensive work in Oregon:

(1) Until such time as we abandon all ideas of preventing the spread of blister rust artificially, we must apply quarantine measures, and if possible, prevent local and general intensification of the disease for the protection of Idaho and California.

(2) Oregon offers a set of conditions which may affect vitally the blister rust situation in the west, conditions of which we are partially or utterly ignorant. Let me briefly state a few of these.

a. As we go south, our first stands of sugar pine occur in Western Oregon, and we have only meager knowledge based on the reaction of this species to blister rust entirely outside its natural range and away from its natural conditions from which to predict the results when once the disease reaches southern Oregon.

b. Our coast wild black currant, Ribes bracteosum, has been

the chief offender west of the Cascades. Today we know too little about it ecologically and otherwise. There is no more reason for studying it in Oregon than in Washington, but it needs further investigation.

c. Oregon offers a great variety of Ribes, most of which are associated with white or sugar pine, the ecology of which we know practically nothing, and of whose reaction to blister rust we know nothing. Among these Ribes we have some species which are never leafless and which thus offer conditions for overwintering of the disease and uredinial spread not known north of Oregon.

(3) While western white pine is of little commercial importance in Oregon, there seems to be abundant reason for believing that it will become commercially important in the future in both natural and artificial reforestation if it can be properly protected against blister rust.

(4) The sugar pine in southern Oregon must be protected for the values at stake as well as for the protection of California, and the date at which this work must be started on a large scale is not remote.

2. Work in Previous Years

The only work done in Oregon prior to 1925 was extensive in the extreme. Black currant eradication began in 1922 and has continued through to the present, though it was nominally finished in 1926. In 1922 some scouting which had an ecological bearing was done in eastern Oregon, and during the three succeeding years, some data was collected by the scouts looking for black currants and those looking for blister rust. In 1925 Melis and myself did some scouting in southern Oregon preliminary to establishing the eradication plots near Prospect, and in 1926 a very general reconnaissance was made along the crest of the Cascades. All of this work revealed the fact that Ribes are abundant and that much information on their ecology is needed.

3. Plan of the Ecology Work

Since it was thought best to do some ecological work before going into any general eradication, a plan was formed for combining ecological and eradication work on a small scale. In the Ribes studies areas of sufficient size would be eradicated to determine the probable value under different conditions and with different species of Ribes. Also a series of plots representing different conditions would be staked for study during a series of years. In the section where eradication was done in 1925, checking on a good scale would be followed up.

the other difficulties exist in the Cascades. Today we know too little about it ecologically and otherwise. There is no more reason for studying it in Oregon than in Washington, but it needs further investigation.

6. Oregon offers a great variety of Ribes, most of which are associated with white or sugar pine, the ecology of which we know practically nothing, and of whose reaction to blister rust we know nothing. Among these Ribes we have some species which are never localized and which thus offer conditions for overwintering of the disease and urediniol spread not known north of Oregon.

(3) While western white pine is of little commercial importance in Oregon, there seems to be abundant reason for believing that it will become commercially important in the future in both natural and artificial reforestation if it can be properly protected against blister rust.

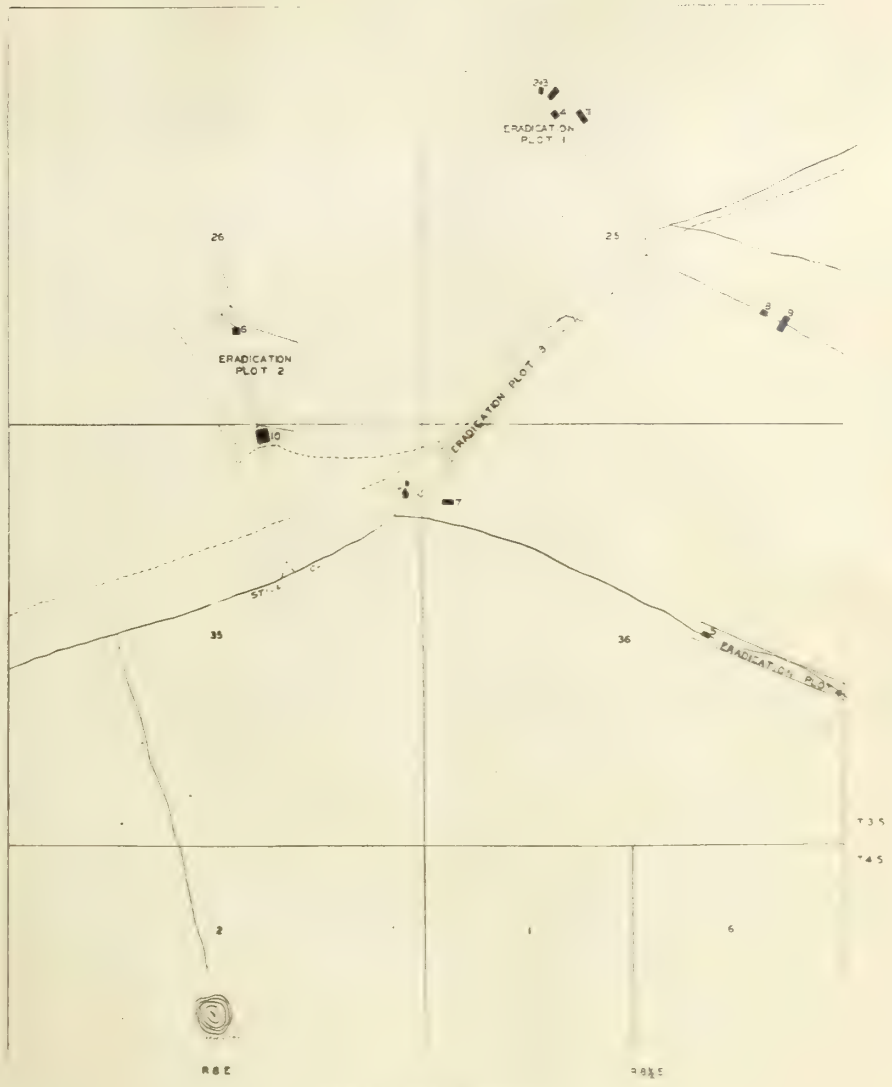
(4) The sugar pine in southern Oregon must be protected for the values at stake as well as for the protection of California, and the date at which this work must be started on a large scale is not remote.

5. Work in previous years

The only work done in Oregon prior to 1928 was extensive in the extreme. Black currant eradication began in 1922 and has continued through to the present, though it was nominally finished in 1928. In 1922 some scouting which had an ecological bearing was done in eastern Oregon, and during the three succeeding years, some data was collected by the scouts looking for black currants and these looking for blister rust. In 1928 Wolfe and Wycoff did some scouting in southern Oregon preliminary to establishing the eradication plots near Prospect, and in 1926 a very general reconnaissance was made along the crest of the Cascades. All of this work revealed the fact that Ribes are abundant and that much information on their ecology is needed.

6. Plan of the ecology work

Since it was thought best to do some ecological work before going into any general eradication, a plan was formed for combining ecological and eradication work on a small scale. In the Ribes studies areas of sufficient size would be established to determine the probable value under different conditions and with different species of Ribes. Also a series of plots representing different conditions would be staked for study during a series of years. In the section where eradication was done in 1928, checking on a good scale would be followed up.



STILL CREEK AREA
OREGON
9E7

■ ECOLOGY PLOTS 8 - MILE

4. Location of the Work

The area chosen for the initial work is located in the Mt. Hood National Forest in a planted area. This offers an excellent stand of pine and a set of conditions typical of vast areas of cut-over and burned-over land in the Cascades.

The second area is located near Prospect Oregon. This is typical of extensive areas of sugar pine and has many of the species of Ribes constantly associated with the sugar pines in Oregon. The checking of the old eradication area also offered opportunity to study the results of eradication done in 1925.

Besides the location of ecology and eradication plots, scouting and reconnaissance work was done in both the regions above mentioned and in the Detriot, Breitenbush and northeastern Oregon sections.

STILL CREEK AREA 1927

A. Eradication

Four main plots were laid out and eradicated. In addition, eradication was carried out in connection with several of the ecology plots. This eradication is included in the report of the several ecology plots.

Eradication Plot No. 1.

This area was laid out on a southeast-facing slope in the replanted area near Still Creek Camp. This area includes some steep, rocky hillside, and some swampy, wet ground.

This was the first area for eradication that was laid out, and it included different types of conditions that the various species of Ribes might be studied. On the higher slopes, the species were mostly R. sanguineum, and in the lower, wet places, R. lacustre predominated, with some R. bracteosum.

Several small ecological plots were laid out in the area.

The eradication work was started with a crew of all new men, and for this reason a portion of the work had to be rechecked.

For the most part the crew was run with four men in line, and two checkers. The work was carried out more with an idea to very thoroughly cover the ground, rather than to show speed of eradication. For this reason considerably more time was spent than would ordinarily be necessary for like conditions. A total of 115 man-days were spent in the eradication. The areas comprised 30 acres, making 3.8 man-days per acre.

4. Location of the Work

The area chosen for the initial work is located in the Mt. Hood National Forest in a planted area. This offers an excellent stand of pine and a set of conditions typical of vast areas of cut-over and burned-over land in the Cascades.

The second area is located near Prospect Oregon. This is typical of extensive areas of sugar pine and has many of the species of Ribes constantly associated with the sugar pines in Oregon. The checking of the old eradication area also offered opportunity to study the results of eradication done in 1928.

Besides the location of ecology and eradication plots, scouting and reconnaissance work was done in both the regions above mentioned and in the District, Bretenbush and Northeastern Oregon sections.

STILL CREEK AREA 1929

A. Eradication

Four main plots were laid out and eradicated. In addition, eradication was carried out in connection with several of the ecology plots. This eradication is included in the report of the several ecology plots.

Eradication Plot No. 1.

This area was laid out on a southeast-facing slope in the replanted area near Still Creek Camp. This area includes some steep, rocky hillside, and some swampy, wet ground.

This was the first area for eradication that was laid out, and it included different types of conditions that the various species of Ribes might be studied. On the higher slopes, the species were mostly R. [illegible], and in the lower, wet places, R. lacustre predominated, with some R. bracteosum.

Several small ecological plots were laid out in the area.

The eradication work was started with a crew of all new men, and for this reason a portion of the work had to be rechecked.

For the most part the crew was run with four men in line, and two checkers. The work was carried out more with an idea to very thoroughly cover the ground, rather than to show speed of eradication. For this reason considerably more time was spent than would ordinarily be necessary for like conditions. A total of 118 man-days were spent in the eradication. The areas comprised 30 acres, making 3.8 man-days per acre.

The results of eradication are tabulated below.

As will be noted from the table, these bushes are nearly all old bushes. A few seedlings were found of R. lacustre and R. bracteosum. A few 3-4 year old R. sanguineum were found, but no seedlings of that species. The size of the bushes made eradication rather difficult.

TABLE NO. 6
Summary of
Eradication Data on Plot No. 1
Still Creek Area, 1927

Species	No.	% Total	Ft. Live Stem	% Total	Live Stem Per Bush	No.	Live Stem Per Acre
R. sang.	412	13%	18,345	25	50.5	13.7	611.5
R. lac.	2,647	80	49,295	70	23.	78.2	1,643.
R. bract.	252	7	5,078	5	20.4	8.4	169
R. visco.	1		.5		.5		
Totals	3,012	100%	72,718	100	94.4	100.3	2,423.5

Note: Rechecking results are included in table.

Total man-days	115
Acres per man-day	0.36
Total bushes per man-day	26.2
Ft. Live Stem per man-day	632.3

Average height of bushes: R. sanguineum, 3.08 feet.
R. lacustre 2.4 feet.
R. bracteosum 2.9 feet.

The results of eradication are tabulated below.

As will be noted from the table, these beetles are mostly all old beetles. A few seedlings were found of P. lacunate and P. praetecta. A few 3-4 year old P. sanguinea were found, but no seedlings of that species. The size of the beetles made eradication rather difficult.

TABLE No. 1

Summary of

eradication data on plot No. 1

Hill Crest Area, 1927

Species	No.	Total	Total	Live Stem per Acre
P. sanguinea	413	136	18,348	85	80.8	13.7	611.5
P. lacunata	2,347	80	49,295	70	23.	76.3	1,952.
P. praetecta	352	7	8,078	5	2.4	2.4	134
P. vitrea	1						
Totals	2,813	1004	75,716	100	36.1	100.1	2,698.3

Note: Reproducing results are included in table.

Total man-days 113

Acres per man-day 0.88

Total beetles per man-day 26.3

Ft. live stem per man-day 682.3

Average height of brush: P. sanguinea 5.09 feet.
P. lacunata 5.6 feet.
P. praetecta 5.1 feet.

TABLE NO. 4

Approximate No. of Ribes Bushes Per Acre By Height Classes Still Creek Area Eradication Plot No. 1, 1927

Height Class	R. sanguineum No. Bushes	R. sanguineum % of Total	R. lacustre No. Bushes	R. lacustre % of Total	R. bracteosum No. Bushes	R. bracteosum % of Total
Up to 1 Ft.	2.6	18.5	19.5	2.5	2.5	30
1-2 Ft.	2.6	18.5	17.2	22.	1.5	18
2-3 Ft.	3.0	21	23.5	30.5	1.5	18
3-4 Ft.	3.0	21	14.5	19	1.5	18
4-5 Ft.	1.6	12	2.8	3	1.0	11
Over 5 Ft.	1.0	8	.7	.8	.4	5

Eradication Plot No. 2

Size and Location: This plot, consisting of about 29 acres, is located 35 chains west and 20 chains north of the blister rust camp, which is the site of the Forest Service cabins on the Still Creek planted area. The plot lies mostly in Sec. 26 R. 8 W. T. 3 S, a large part of it being in forty #15. A small portion is in forty #2 of Sec. 35.

Description of the Site: This plot is a portion of an old burn, which was planted to pine and fir by the Forest Service. The portion on which this plot occurs has at present a fair growth of western white pine. It is on a steep south-facing slope, but a small stream flowing lengthwise of the plot, has formed a ravine-like cut with steep east and west-facing slopes. The plot extends from the crest of the ridge on either side of the stream, and from the lower edge of the white pine planting to the upper. The stream type is very narrow, constituting about one acre of the entire plot, but it had grown up to an abundance of Ribes bracteosum and R. lacustre. The slopes are so steep as to form rock slides in places. On these slopes occurred a considerable number of R. sanguineum. The entire area, except the mossy stream banks, is practically devoid of humus.

Purpose: All the work in this region has an ecological bearing. This site seems to offer an excellent opportunity to study the encroachment of Ribes into an eradicated area where there is little shade, practically no humus, and where the ground has a tendency to slide, thus renewing the soil and burying seeds. The stream offers an excellent opportunity to study the spread down stream of R. bracteosum and R. lacustre, both of which species remain uneradicated above the plot. Again the eradication constitutes a part of the sanitation of this district. This plot also offered the eradication crew its first opportunity to eradicate R. bracteosum, and constituted a site for learning the best methods on this species.

TABLE NO. 4

Average Yields in Gm. of Alder Twigs per Acre in Point
Cleaves Hill Creek Area Precipitation
Plot No. 1, 1927

Date of Clip	% Moisture		% Leaves		% Dry Matter	
	No.	% of Total	No.	% of Total	No.	% of Total
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1-4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3-4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4-4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Over 5 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Irradiation Plot No. 2

Site and Location: This plot, consisting of about 20 acres, is located 45 chains west of a chain north of the Winter road [illegible], which is the site of the Forest Service cabins on the Still Creek planted area. The plot lies mostly in Sec. 16 T. 8 N., R. 4 E., a large part of it being in Forty #5. A small portion is in Forty #8 of Sec. 15.

Description of the Site: This plot is a portion of an old burn, which was planted to pine and fir by the Forest Service. The portion on which this plot occurs has at present a fair growth of western white pine. It is on a steep south-facing slope, but a small stream flowing lengthwise of the plot, has formed a ravine-like cut with steep east and west-facing slopes. The plot extends from the crest of the ridge on either side of the stream, and from the lower edge of the white pine planting to the upper. The stream type is very narrow, constituting about one acre of the entire plot, but it had grown up to an abundance of Ribes bracteosum and R. lacustre. The slopes are so steep as to form rock slides in places. On these slopes occurred a considerable number of R. sanguineum. The entire area, except the mossy stream banks, is practically devoid of humus.

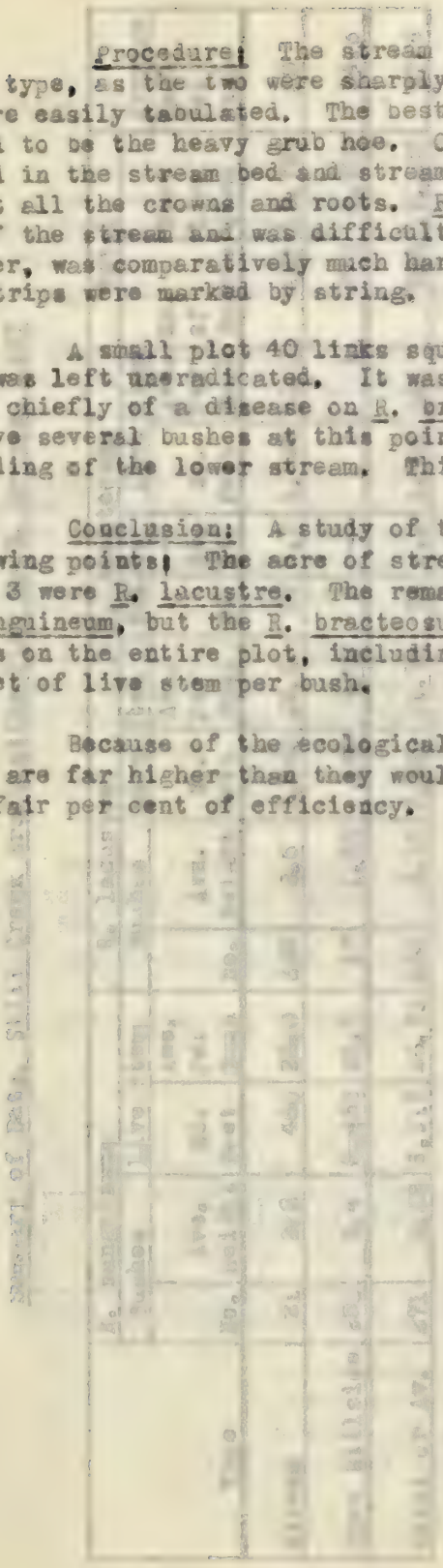
Purpose: All the work in this region has an ecological bearing. This site seems to offer an excellent opportunity to study the encroachment of Ribes into an eradicated area where there is little shade, practically no humus, and where the ground has a tendency to slide, thus renewing the soil and burying seeds. The stream offers an excellent opportunity to study the spread down stream of R. bracteosum and R. lacustre, both of which species remain unmolested above the plot. Again the eradication constitutes a part of the annihilation of this district. This plot also offers the eradication crew its first opportunity to eradicate R. bracteosum, and constitutes a site for learning the best methods on this species.

Procedure: The stream type was worked separately from the slope type, as the two were sharply defined, and as the data could thus be more easily tabulated. The best equipment for the R. bracteosum proved to be the heavy grub hoe. On this site this species was heavily rooted in the stream bed and stream banks, and care had to be exercised to get all the crowns and roots. R. lacustre likewise rooted in the bed of the stream and was difficult to eradicate. The R. bracteosum, however, was comparatively much harder to remove. The boundaries of the strips were marked by string.

A small plot 40 links square in the extreme upper end of this area was left uneradicated. It was set off as an ecology plot for the study chiefly of a disease on R. bracteosum. It was also thought best to have several bushes at this point for seed bushes for the natural reseeding of the lower stream. This plot is reported elsewhere.

Conclusion: A study of the tabulated results brings out the following points: The acre of stream type yielded 423 bushes, of which about 3 were R. lacustre. The remaining one-fourth were R. bracteosum, R. sanguineum, but the R. bracteosum yielded 2/5 of the live stem. The bushes on the entire plot, including stream and slope types, averaged 30 feet of live stem per bush.

Because of the ecological nature of this work, the costs in labor are far higher than they would be in a straight eradication job of a fair per cent of efficiency.



Procedure: The stream type was worked separately from the slope type, as the two were clearly defined, and as the data could thus be more easily tabulated. The best equipment for the P. bracteosum proved to be the heavy grub hoe. On this site this species was heavily rooted in the stream bed and stream banks, and care had to be exercised to get all the crowns and roots. P. lanatum likewise rooted in the bed of the stream and was difficult to eradicate. The P. bracteosum, however, was comparatively much easier to remove. The bound-ends of the soils were marked by string.

A small plot 40 links square in the extreme upper end of this area was left undisturbed. It was set off as an ecology plot for the study chiefly of a disease on P. bracteosum. It was also thought best to have several bushes at this point for seed bushes for the natural reseeding of the lower stream. This plot is reported elsewhere.

Examination: A study of the tabulated results brings out the following points: The acre of stream type yielded 695 bushes, of which about 1 were P. lanatum. The remaining one-fourth were P. bracteosum, P. arcuatum, but the P. bracteosum yielded 3/5 of the five stem. The bushes on the entire plot, including stream and slope types, averaged 20 feet of five stem per bush.

Because of the ecological nature of this work, the costs in labor are far higher than they would be in a straight eradication job of a fair per cent of efficiency.

TABLE NO. 5

Summary of Data, Still Creek Eradication Plot No. 2, Oregon, 1927

Type	R. sanguineum				R. lacustre				R. bracteosum				Total		Average
	Bushes		Live Stem		Bushes		Live Stem		Bushes		Live Stem				
	No.	Ave. Height	No. Feet	Ave. Per Bush	No.	Ave. Height	No. Feet	Ave. Per Bush	No.	Av. Ht.	No. Feet	Ave. Per Bush	No. of Bushes	Feet Live Stem	Feet Per Bush
Stream	21	2.2	460	22.0	383	2.6	7,440	22.0	69	3.5	4,825	30.0	423	12,725	30
Open Hillside	250	2.4	6,455	26.0	17	1.68	140	8.03	5	--	5	1	272	6,600	24.3
Total or Av.	271	2.38	6,915	25.73	350	2.55	7,580	21.74	74	3.3	4,830	30	695	19,325	27.8

	Stream	Open Hillside	Total or Av.
Acres	1	28	29
Bushes per acre	423	9.7	24
Ft. Live Stem Per Acre	12,725	236	666.4
Total man-days	21	12	33
Bushes Per day per man	20	22.7	21

Eradication Plot No. 3

Eradication area No. 3 was laid out on Still Creek, extending from a point near camp to about 44 chains up stream, and including both banks of the stream. The width of the strip varies from 1 to 5 chains. This variation was necessary to include all of the creek type, because of the swampy condition along one side.

The purpose of the plot was to get an estimate on the cost of eradication of that type, and also to gather some ecological data on the bushes along the stream.

The eradication was done by a four man crew with two checkers, one checker for each two crewmen, to insure thorough eradication. An effort was made to keep conditions as near as possible to those necessary for extensive eradication of such type, although no doubt the work could be speeded up a little as the crew became more experienced.

A total of 50 man-days was spent in eradicating the thirty acres, or 1.6 man-days per acre. It must be remembered that a considerable portion of this area was grown to a heavy stand of R. lacustre and R. bracteosum in swampy conditions, which is very difficult to eradicate. The crew found it necessary to use the large sized hazel-hoes for the work.

Bushes found included R. lacustre, R. bracteosum, and R. triste. Approximately 39% of the bushes, and 60% of the live stem were R. lacustre; 59% of the bushes and 39% of the live stem, R. bracteosum; and 2% of the bushes and 1% of the live stem, R. triste.

The following table gives the data of bushes pulled:

TABLE NO. 6

Species	No.	% of Total	Ft. L. S.	% Total	L.S. per Bush	Number per Acre	L.S. per A
R. lac.	1,156	39	20,175	60	17.5	38.5	673.5
R. bract.	1,705	59	16,337	39	9.5	56.8	544.5
R. triste	71	2	282	1	4	2.3	9.4
Total	2,932	100	36,794	100	31.0	97.7	1,226

Total man-days	50
Acres per man-day	1.6
Bushes per man-day	58.6
Ft. live stem per man-day	735.9

Total man-days 50
Acres per man-day 1.6
Bushels per man-day 58.5
Pct. live stem per man-day 73.3

Species	No.	Total %	% total	% per Block	Number per Acre	Pct.
A. laev.	1,150	34	17.1	50	58.5	57.3
B. brevi.	1,708	50	15.4	41	87.1	85.4
C. virgin	71	2	3.1	4	3.6	3.4
Total	3,429	100	35.6	100	87.7	1,429

A superficial observation would indicate that the cost of such work is prohibitive, but it must be remembered that much surrounding area could be worked with a scout crew.

Some comparisons of costs and results of this type of eradication with chemical eradication of similar type should be made.

TABLE NO. 7

Ecological Data of Ribes bracteosum Eradication Plot No. 3
By Height Classes

Height of Bushes in Feet											
1		2		3		4		5		Over 5	
No. Per Acre	% of Total	No. Per Acre	% of Total	No. Per Acre	% of Total	No. Per Acre	% of Total	No. Per Acre	% of Total	No. Per Acre	% of Total
21.5	38	21.2	36	9.4	17.5	3.2	5.5	0.8	1.5	0.7	1.5

TABLE NO. 8

Ecological Data of R. lacustre Eradication Plot No. 3
By Feet Live Stem Classes

0 - 5		5 - 10		10 - 20		20 - 30		30 - 50		Over 50	
No. Per Acre	Per Cent	No. Per Acre	Per Cent	No. Per Acre	Per Cent	No. Per Acre	Per Cent	No. Per Acre	Per Cent	No. Per Acre	Per Cent
15	40	9	24	5.5	15	3	8	1.8	5	3.6	8

Eradication Plot No. 4

Size and Location: This plot is a narrow strip along a stream running into the south side of Still Creek. The lower line is about 1/2 mile from the blister rust camp and S 50°E of it. It extends from 1 chain below Ecology Plot No. 5 to the top of the ridge.

Description of Site: This plot is along a rapidly flowing stream, which, for the most part, flows through a narrow gulch or gully. It rises below the saddle west of Eureka Mountain and flows northwest. The entire area has been repeatedly burned and was planted in 1918 and 1919 to white pine, Douglas fir and Noble fir. A part of the stream within this area is growing up to white fir and hemlock by natural seeding. The ground, except for the immediate stream banks, is devoid of hemlock. Ribes bracteosum and Ribes lacustre were abundant along the stream.

Procedure: A portion of the stream within this area was set aside by the ecology crew to study the effect of shade on the spread and growth of R. bracteosum and to study the spread of R. bracteosum and R. lacustre down stream. See discussion of this plot under Ecology Plot No. 5. As the eradication was done merely to clear out around the plot, no definite data was taken as to the exact area of ground eradicated. The usual data was kept on all bushes pulled. Eradication was performed by regular crew, one full day being spent by a 6- man crew.

Data: Bushes eradicated are as follows:

TABLE NO. 9

Species	Number	Average Height	Total Live Stem	Average L.S. Per Bush
R. lac.	101	3.14 Ft.	4,733 Feet	46.8 Ft.
R. visc.	3	3	50	25
R. sang.	1	5	250	250
Total	104		5,032	48.3

B. Ecology

Ecology Plot No. 1

This plot .4x2.4 chains is situated about 2/3 of the way up the slope north of Still Creek, within Eradication area No. 1 and toward its northern boundary. (See page). It is located on a steep south-facing slope that was burned over many years ago and planted to white pine in 1917. Mineral soil is everywhere exposed; in fact, there is extremely little duff of any kind. The trees are chiefly white pine, with a few Douglas fir. The shrubby ground cover is sparse and consists of willow (Salix sp.). Maples (Acer glabrum), Pachistima myrsinites, Rubus parviflorus, Huckleberry (Vaccinium sp.), Oregon Grape (Berberis nervosa), and Ribes sanguineum. Burned stumps and logs are present but constitute only a slight ground cover. Herbaceous growth consists of Epilobium sp., Vagnera amplexicaulis, Pteridium aquilinum, Pentstemon sp., Achlys triphylla, Cornus canadensis, and grass and sedge species.

Object: 1. To study growth and reproduction of R. sanguineum on such sites as the above described, i.e., the exposed mineral soil, exposed south-facing slope.

2. To study the effect of shading on R. sanguineum in the future.

All Ribes were located and locations mapped, data were taken on each bush, giving amount of live stem, amount of dead stem and age of bush.

On the 96 milacres there were 7 R. sanguineum bushes 3-5 feet in height, with a total of 829 feet of live stem and 99 feet of dead stem. Per acre, this works out to 75 bushes, 8,573 feet of live stem and 1,031 feet of dead stem.

Each year notes will be taken on the amount of live and dead stem and the number and location of seedlings. As the trees begin to shade the bushes, notes will be taken on the effect of this shade.

Ecology Plot No. 2

Plots 2 and 3 lie together twenty-five yards to the northwest of Plot 1. On Plot No. 2, .4X.8 chains (32 milacres), the R. sanguineum bushes were each located and individual data taken. The Ribes bushes were then each cut off just below the crown.

Note: Because of the looseness of the soil, it was difficult to cut off these bushes at the surface of the ground.

Object: To learn whether R. sanguineum sprouts from roots and stumps left in the ground after eradication. An attempt was made to leave none of the exposed crown, but to cut just below this, thus eliminating the crown sprouting, but giving ample opportunity for root sprouting.

Future Data: (1) Look for growth of new R. sanguineum bushes from the root parts left in the ground.

(2) Look for seedlings growing from soil disturbed about the site of each bush during eradication.

Ecology Plot No. 3

Plot No. 3, .4X.8 chains, is located on the steepest part of the slope, toward the top of the ridge. The ground is very lightly covered with vegetation and about half of the plot is a bare outcrop of rock. The remainder has no accumulated humus. The plot is within Eradication Plot No. 1 and within the planted area, all the trees here being western white pine, seven years old and six feet in height.

Object: To compare the results of eradication by pulling, the type used on this plot, with those used in plot 2, where the bushes were cut off below the crown.

Procedure: The Ribes sanguineum bushes (4 in number) were each located on a map of the plot. A numbered stake was placed at the site of each bush. Data was taken on each individual bush. Each

On the 36 milacres there were 7 *B. sanguineum* bushes 3-5 feet in height, with a total of 888 feet of live stem and 93 feet of dead stem. Per acre, this works out to 73 bushes, 8,876 feet of live stem and 1,031 feet of dead stem.

Each year notes will be taken on the amount of live and dead stem and the number and location of seedlings. As the trees begin to shade the bushes, notes will be taken on the effect of this shade.

Sample Plot No. 4

Plots 3 and 4 lie together twenty-five yards to the northwest of Plot 1. On Plot No. 4, 42.8 chains (32 milacres), the *B. sanguineum* bushes were each located and individual data taken. The Ribes bushes were then each cut off just below the crown.

Data: Because of the looseness of the soil, it was difficult to cut all these bushes at the surface of the ground.

Objects: To learn whether *B. sanguineum* sprouts from roots and stumps left in the ground after eradication. An attempt was made to leave none of the exposed crown, but to cut just below this, thus eliminating the crown sprouting, but giving ample opportunity for root sprouting.

Future Data: (1) Look for growth of new *B. sanguineum* bushes from the root parts left in the ground.

(2) Look for seedlings growing from soil disturbed about the site of each bush during eradication.

Sample Plot No. 5

Plot No. 5, 42.6 chains, is located on the steepest part of the slope, toward the top of the ridge. The ground is very lightly covered with vegetation and about half of the plot is a bare outcrop of rock. The remainder has no communicated humus. The plot is within Eradication Plot No. 1 and within the planted area, all the trees here being western white pine, seven years old and six feet in height.

Objects: To compare the results of eradication by pulling, the type used on this plot, with those used in plot 3, where the bushes were cut off below the crown.

Procedure: The Ribes *sanguineum* bushes (4 in number) were each located on a map of the plot. A numbered stake was placed at the site of each bush. Data are taken on each individual bush. Each

bush was then eradicated by very thorough pulling and grubbing out, so that very little root was left in the ground.

Data to be Taken Next Season: Look carefully for possible sprouting up from the roots left in the ground of the four bushes eradicated. Also examine the site of each bush, where the ground was disturbed for possible seedling Ribes. Compare with Plot No. 2.

Ecology Plot No. 4

This plot, .2X.4 chains, is located about half way up the slope north of Still Creek, within Eradication Plot No. 1.

Description of Site: The plot was so chosen that the stream ran through it lengthwise. It is on a steep south-facing slope. There is no tall vegetation, such as trees or tall shrubs to make a dense shade, but low shrubbery, mostly Rubus and Ribes and herbaceous vegetation, mostly sedges and grasses are abundant. Moss is so profuse that the stream banks are boggy, and the stream has no definite channel. The Ribes species are Ribes bracteosum and Ribes lacustre

Object: We wish to learn whether Ribes of these species spread from a typical situation like the one chosen, to surrounding ground by gravitational means, either by the seeds dropping directly on the ground or by falling into the water and being carried some distances.

Prodedure: The plot was staked and data taken on the bushes present. The bushes were not disturbed. In fact all conditions on the plot were left as much intact as possible. The area all about the plot, however, was worked carefully by the Ribes eradication crew.

Data to be Taken Next Season and Following: The ground all about the plot will be studied for seedlings which may have come from seeds produced on the plot. Similar areas above the plot, where all the Ribes were eradicated and no seed bushes left, will be used as check plots. This procedure should be followed each year for several years. Comparisons will also be made with conditions on plots 5, 6 and 7, and with other shade conditions.

Ecology Plot No. 5

This plot, .8 by .4 chains, is situated within Eradication Area No. 4, near the source of a small stream on the slope south of Still Creek. The entire region is an old burn. At this point a clump of trees remains, probably saved from the fires that destroyed all the nearby trees by the very moist habitat. A vigorous growth of R. bracteosum and R. lacustre was found here, growing close along the stream, and in such a situation that they are being rapidly shaded by the forest trees. The trees on the plot are cedar, hemlock and white fir.

Boulder Plot No. 4

This plot, .3X.4 chains, is located about half way up the slope north of Still Creek, within Mensies Plot No. 1.

Description of site: The plot was so chosen that the stream ran through it lengthwise. It is on a steep south-facing slope. There is no tall vegetation, such as trees or tall shrubs to make a dense shade, but low shrubbery, mostly Ribes and Rubus and herbaceous vegetation, mostly sedges and grasses and Aconitum. Rock is so prevalent that the stream bed is very irregular. The Ribes species are Ribes bracteosum and Ribes lacustre.

Method: It was hard to learn whether Ribes of these species were killed by the elimination of the cover, to increase ground temperature by artificial means, either by the shade dropping directly on the ground or by falling into the water and being carried some distance.

Conclusions: The plot was located on the basis of the presence of the Ribes species in quantity. In fact all conditions on the plot were left as much intact as possible. The data all about the plot, however, was gathered carefully by the line transection crew.

Plots to be taken next season and following: The ground all about the plot will be scouted for seedlings which may have come from seeds produced on the plot. Similar areas above the plot, where all the Ribes were eradicated and no seed bearers left, will be used as check plots. This procedure should be followed each year for several years. Comparisons will also be made with seedlings on plots 2, 3, and 5, and with other stands available.

Boulder Plot No. 5

This plot, .3X.4 chains, is situated within [illegible] a small stream on the slope south of Still Creek. The entire region is an old burn. At this point a clump of trees remains, protected from the fires that destroyed all the nearby trees by the rugged nature of the terrain. A vigorous growth of [illegible] and Ribes and Rubus, [illegible] close cover the slope, and in such a situation that they are [illegible] shaded by the forest trees. The trees on the plot are cedar, hemlock and white fir.

Procedure: The plot was staked out and a map made to show location of all significant features.

Three bushes were marked with stakes, and data taken on each bush.

Eradication: The area around the plot for a distance of one chain below and to the top of the ridge above was eradicated. As this eradication was done merely to clear the area around the plot, the exact acreage was not estimated. The bushes eradicated are as follows:

TABLE NO. 10

Species	No. of Bushes	Average Height	Average L.S. Per Bush	Total Live Stems
R.lac.	101	3.14 Ft	46.8 Ft.	4,732 Ft
R.visco	2	3	25	50
R.sang.	1	5	250	250
Total or Average	104	3.15 Ft	48.3 Ft.	5,032 Ft

Object: (1) To determine the effect of shade produced by encroaching coniferous forest, on the growth of R. lacustre and R. bracteosum.

(2) The Ribes along the stream for 1 chain below this plot were eradicated and the effect of reseeding in this portion will be observed. As all of the stream Ribes i.e., R. lacustre and R. bracteosum, are eradicated above the plot, the seeding will of necessity come from this plot.

Further data: To be of most value, this plot must be carefully observed over a period of several years. Each year very careful data should be taken to find the effect on the Ribes of the increasing coniferous shade. Such data should include:

(1) General data on the apparent thriftiness of the Ribes on plot.

(2) Specific data on 20-30 separate bushes, this data to include live stem, dead stem, new growth, number of leaves, etc. Each bush should be located by a stake and a metal tag attached, with number, that will make identification certain. Great care should be taken not to disturb the bush by injury.

(3) Data on flowering or fruiting condition on the plot.

(4) If possible, some means of determining and recording the shade conditions at each bush should be devised which will be accurate enough to be of value.

Procedure: The plot was staked out and a map made to show location of all significant features.

Three bushes were marked with stakes, and data taken on each bush.

Eradication: The area around the plot for a distance of one chain below and to the top of the ridge above was eradicated. As this eradication was done merely to clear the area around the plot, the exact acreage was not estimated. The bushes eradicated areas follows:

TABLE NO. 10

Species	No. of bushes	Average height per bush	Total (?)
R. lae.	100	4'.14 ft.	41'.2 ft.
E. vitae	3	20	60
P. cana.	7	3'.0	21'.0
Total or average	124	3'.15 ft.	42'.2 ft.

Object: (1) To determine the effect of shade produced by encroaching coniferous forest, on the growth of R. laevigata and R. brevisepalum.

(2) The Ribes along the stream for 1 chain below this plot were eradicated and the effect of reseeding in this portion will be observed. As all of the stream Ribes i.e., R. laevigata and R. brevisepalum, are eradicated above the plot, the seeding will of necessity come from this plot.

Further Data: To be of most value, this plot must be carefully observed over a period of several years. Much year by year data should be taken to find the effect on the Ribes of the increasing coniferous shade. Such data should include:

(1) General data on the apparent thriftiness of the Ribes on plot.

(2) Specific data on 30-50 separate bushes, this data to include live stem, dead stem, new growth, number of leaves, etc. Each bush should be located by a stake and a metal tag attached, with number, that will make identification certain. Every care should be taken not to disturb the bush by injury.

(3) Data on flowering or fruiting condition on the plot.

(4) If possible, some means of determining and recording the shade conditions at each bush should be devised which will be accurate enough to be of value.

Ecology Plot No. 6.

This plot, of irregular shape, 1.88X1.12X1.79X.89 chains, was laid off at the upper edge of eradication area No. 2, near the head waters of a small stream. The areas on all sides of this plot were eradicated by the regular crew, leaving this plot uneradicated. The plot extends across the stream, which at this point widens out over a boggy and less steep place. This bog is built up by the growth and dying down of generations of moss, ferns and herbaceous plants. Several clumps of R. bracteosum were found growing here. These bushes had a large amount of dead stem, and were found to be infected with the fungus Ceriospora ribis. To what extent the dead stem was due to this disease, or some other cause, e.g. winter killing, could not be determined. The plot is located in an area planted to white pine. These are much smaller, 3-5 feet high, than those of the same age at lower elevations in this same region.

Procedure: Three patches of R. bracteosum, were staked for special study. Two to three bushes on each of these plots were staked and special data (height, live stem, dead stem, etc.) were taken. The rest of the bushes in each of these plots were also recorded and data taken. These may give some good comparative data the following seasons.

Object: (1) To study the progress and effect on R. bracteosm, of the fungus Ceriospora ribis.

(2) To get data on spread of Ribes bracteosum down a stream into an eradicated area.

(3) To note the effect of increasing shade on the vigor and growth of R. bracteosum. This can hardly be noted for several years.

(4) To determine what conditions are favorable, and what unfavorable, for the production of fruit by R. bracteosum (plants in this plot were very lightly fruited.) i.e., Does the Ceriospora inhibit fruit production? How do open and shade conditions affect fruiting? What is the effect of north and south exposure?

Data for Succeeding Seasons: (1) Make careful records on each plot, as before. Note especially the staked plants. These plants should be marked by fastening a numbered metal tag on each.

(2) Make a very careful examination of stream below plot, in eradicated area, for possible spread of plants down the stream.

(3) Make studies to determine, if possible, whether R. bracteosum bushes are being killed by the fungus Ceriospora ribis and

Mexico, Plot No. 8.

This plot, of irregular shape, is 33ft. 7in. by 25 chains, was laid off at the upper edge of eradication area No. 2, near the head waters of a small stream. The areas on all sides of this plot were eradicated by the regular crew, leaving this plot unmedicated. The plot extends across the stream, which at this point widens out over a boggy and less steep place. This bog is built up by the growth and dying down of generations of moss, ferns and herbaceous plants. Several clumps of P. Pteretorum were found growing here. There trees and a large amount of dead stem, and were found to be infested with the fungus Coriolopsis rigida. To what extent the dead stem was due to this disease, or some other cause, e.g. winter killing, could not be determined. The plot is located in an area planted to white pine. These are much smaller, 6-8 feet high, than those of the same age at lower elevations in this same region.

Procedure: Three patches of P. Pteretorum were staked for special study. Two to three trees on each of these plots were staked and special data (height, live stem, dead stem, etc.) were taken. The rest of the trees in each of these plots were also recorded and data taken. These may give some good comparative data the following seasons.

Object: (1) To study the progress and effect on P. Pteretorum of the fungus Coriolopsis rigida.

(2) To get data on spread of Fomes Pteretorum down a stream into an eradicated area.

(3) To note the effect of increasing shade on the vigor and growth of P. Pteretorum. This can hardly be noted for several years.

(4) To determine what conditions are favorable, and what unfavorable, for the production of fruit by P. Pteretorum (plants in this plot were very lightly fruited, i.e., when the Coriolopsis inhibit fruit production! How do open and shade conditions affect fruiting? What is the effect of warm and south exposure?

Data for Succeeding Seasons: (1) Make careful records on each plot, as before. Note especially the staked plants. These plants should be marked by fastening a numbered metal tag on each.

(2) Make a very careful examination of six-rm below plot, in eradicated area, for possible spread of plants down the stream.

(3) Make studies to determine, if possible, whether P. Pteretorum bushes are being killed by the fungus Coriolopsis rigida and

what limits its distribution.

(4) Study similar sites on north facing slopes for presence of Ceriospora.

(5) Make careful records of shade conditions of each bunch of Ribes.

(6) Compare these bushes with bushes in similar sites but not diseased with Ceriospora to determine the effect of the disease on the production of fruit.

Conclusion which can be drawn from studies made thus far: The disease Ceriospora appears to be quite parasitic on the plants on this plot. It is absent on the plants along Still Creek as far as observed. The disease acts as a dieback and crowds well down into the crown. Young growth, however, springs up from the crown. The bushes seem to flower only sparsely. Observations could not be made late enough to determine the effect on the setting of fruit.

Ecology Plot No. 7

Plot No. 7, .4X1.2 chains, is located in the west end of an alder swamp on the south side of Still Creek. The plot was laid out with the object of including a typical area of alder swamps. 36 alders, 30-40 years old and 40 feet high, with 4 hemlocks and 3 white firs constitute the upper story which is open enough to let in a considerable amount of light, about 25%. The ground is very swampy, with standing water in places, rotting logs and a rank growth of skunk cabbage covering 60-80% of the ground. There is also scattered Alder, Dogwood and Salmon Berry with Devil's Club of 20% density.

Ribes bracteosum was abundant throughout this alder swamp. The plants were straggling, trailing, and rooted where the stem had fallen into the wet ground, so that it was difficult to identify single plants.

Eradication: The plot was eradicated thoroughly care being taken to leave the surrounding area undisturbed. 86 R. bracteosum with 2,164 feet of live stem and 13 R. lacustre with 281 feet of live stem were pulled from .048 acres, which averages 2,060 Ribes per acre.

Object: (1) Most of the R. bracteosum bushes in this type of habitat (alder swamp) are found to arise from partly buried stem pieces. Pulling up these bushes by the ordinary means of eradication, will probably leave many of these fragments of stem in the ground from which new plants will arise. The plot will be checked carefully for such plants.

Objects: (1) Most of the R. Procteosum bushes in this type of habitat (alder swamp) are found to arise from partly buried stem pieces. Pulling up these bushes by the ordinary means of eradication will probably leave many of these fragments of stem in the ground from which new plants will arise. The plot will be observed carefully for such plants.

Prediction: The plot was eradicated thoroughly care being taken to leave the surrounding area undisturbed. 86 R. Procteosum with 3,164 feet of live stem and 16 R. lacustre with 881 feet of live stem were pulled from .048 acres, which averages 3,080 Ribes per acre.

Ribes procteosum was abundant throughout this alder swamp. The plants were straggling, trailing, and rooted where the stem had fallen into the wet ground, so that it was difficult to identify single plants.

The dense alder swamp on the south side of Still Creek. The plot was laid out with the object of including a typical area of alder swamp. 86 alders, 40-60 years old and 60 feet high, with 4 hemlocks and 3 white firs constitute the upper story which is open enough to let in a considerable amount of light, about 25%. The ground is very swampy, with standing water in places, rotting logs and a rank growth of skunk cabbage covering 60-80% of the ground. There is also scattered Alder, Dogwood and Salmon Berry with Devil's Club of 30% density.

Plot No. 7. .048 acres, is located in the west end of an

Prelim. Plot No. 7

Conclusion which can be drawn from studies made thus far: The disease Ceriospora appears to be quite prevalent on the plants on this plot. It is absent on the plants along Still Creek as far as observed. The disease acts as a disease and crowds well down into the crown. Young growth, however, springs up from the crown. The bushes seem to flower only sparsely. Observations could not be made late enough to determine the effect on the setting of fruit.

(5) Compare these bushes with bushes in similar sites but not diseased with Ceriospora to determine the effect of the disease on the reduction of fruit.

(4) Study similar sites on north facing slopes for presence of Ceriospora.

(3) Make careful records of shade conditions of each bush of Ribes.

(2) R. bracteosum was left intact about the plot. A check will be made of the spread of these plants back into the plot by layering and seeding.

(3) A number of conifers were growing in and around the plot. They are now smaller than the alders. As they grow, they will produce an increasingly dense shade, more dense than the present deciduous alder shade. A check will be made of the effect of this shade.

(4) The ground on either side of this plot is similar to to the ground with the plot prior to eradication. Some valuable studies can be made on comparative rate of growth of Ribes coming into the eradicated area, and those outside this area.

Conclusions from data gathered: The R. bracteosum growing in swamps of this nature are shallow rooted and can be pulled easily. This is a distinct contrast to R. bracteosum bushes growing in the open, which are heavy rooted and difficult to pull. Layering is much more in evidence in the swamp types.

Ecology Plots Nos 8 and 9.

These plots are situated on the north-facing slope of Eureka Mountain, Plot 8, 1 chain X 1 chain, 13 chains from Still Creek and Plot 9, 1 chain X 2 chains, 3½ chains above Plot 8. The two plots were laid out at slightly different points along the stream in order to have an average of eradication conditions as they occur on this side hill stream type. The stream is a short swift one (total length 28 chains) typical of the many small ones of this kind arising in the boggy spots found far up the slopes of many hillsides. It is typically a Ribes lacustre site, bushes of this species being abundant. The slope is entirely burned over and planted to Pinus monticola.

Plot 9 is located as a point on the stream where it flows from a "shoulder" of the mountain, down a considerably steeper grade. A wet spot has formed here, (due probably to the accumulation of plant material, moss, etc.) which remains boggy through the summer. This site was selected because it represented the stream "at its worst", so far as Ribes are concerned; whereas Plot No. 8 represented an area lighter in Ribes than the average. The two plots considered together should give a fair average for the entire stream.

The long way of the plot staked out is at right angles to the stream, and one square chain of it is not traversed by the stream. This end has very few Ribes.

The Object of These Plots is: (1) To determine the effectiveness of eradicating R. lacustre in this type of location.

iveness of eradicating P. lacustre in this type of location.

The Object of These Plots is: (1) To determine the effect-

in Pines than the average. The two plots considered together should give a fair average for the entire stream.

Pine sites are concerned; whereas Plot No. 8 represented an area slightly was selected because it represented the stream "at its worst", so far as Pine material, moss, etc.) which remains boggy through the summer. This site was selected because it represented the stream "at its worst", so far as Pine sites are concerned; whereas Plot No. 8 represented an area slightly

stream, and one square chain of it is not traversed by the stream. This end has very few Pines.

The long way of the plot started out is at right angles to the

from a "shoulder" of the mountain, down a considerably steeper grade, wet spot has formed here, (due probably to the accumulation of plant

Plot 9 is located as a point on the stream where it flows

slope is entirely burned over and planted to Pinus monticola.

a Pinus lacustre site, member of this species being abundant. The

spots found far up the slopes of many hillsides. It is typically

chains) typical of the many small ones of this kind existing in the bogg

hill stream type. The stream is a short swift one (total length 30

have an average of eradication conditions as they occur on this side

laid out at slightly different points along the stream in order to

Plot 9, 1 chain X 2 chains, 2½ chains above Plot 8. The two plots were

Mountain, Plot 8, 1 chain X 1 chain, 75 chains from Still Creek and

These plots are situated on the north-facing slope of Bruce

Location Plots Nos. 8 and 9.

more in evidence in the swamp type.

open, which are heavy rooted and difficult to pull. Lupering is much

This is a distinct contrast to P. Brewsterum bushes growing in the

in swamps of this nature are shallow rooted and can be pulled easily.

Conclusions from data gathered: The P. Brewsterum growing

graded area, and those outside this area.

can be made on comparative rate of growth of Pines coming into the

to the ground with the plot prior to eradication. Some valuable study

(4) The ground on either side of this plot is similar

more alder shade. A check will be made of the effect of this shade.

produce an increasingly dense shade, more dense than the present decid-

plot. They are now smaller than the alders. As they grow, they will

(3) A number of conifers were growing in and around the

ing and seeding.

will be made of the spread of these plants back into the plot by layer-

(2) P. Brewsterum are left intact about the plot. A check

(2) To determine how rapidly and extensively R. lacustre comes in this kind of place, after eradication.

(3) To determine the probability of spread from uneradicated to eradicated territory.

(4) To find the probable cost of the eradication of Ribes on the numerous hillslope streams. The major part of the Ribes on many such slopes are found along these streams, making the streams much the greatest factor in eradication.

Future Observations: The plots will be checked over very carefully for Ribes, and account taken of every Ribes found, whether from layering, crown sprouts or seeds. Observation will also be made on rate of growth of bushes arising from the different sources.

In addition the site of a small patch of R. bracteosum eradicated from Plot 9 will be checked carefully to note any appearance of seedlings or sprouts.

Eradication: The one square chain in Plot 8 yielded 55 R. lacustre or 550 bushes per acre. The amount of live stem was 2,378 feet or 23,780 per acre. The total labor was 2¼ man-days or 22.5 man-days per acre.

The 2 square chains in Plot 9 yielded 345 R. lacustre and 5 R. bracteosum or 1,750 bushes per acre. The amount of live stem was R. lacustre 10,208 feet and R. bracteosum 400 feet making a total of 10,608 feet or 53,040 feet of live stem per acre. 8¼ man-days were required for the .2 acres or 41¼ man-days per acre.

The total for the two plots was 405 Ribes and 12,986 feet of live stem. 10½ man-days were required for the .3 acres making 35 man-days per acre or .028 acres per man-day. Assuming that the plots are a fair sample of the whole stream, it would take a crew of six men 16½ days (99 man-days) to eradicate the whole stream.

Ecology Plot No. 10

This plot of irregular shape, 3X1X2X1.6X1.35 chains, is located below the lower edges of eradication area No. 2 along a small stream which flows most of the summer. It has an average altitude of about 3,600 feet, and is one-third of the way up the side of Tom, Dick and Harry Ridge. A large number of R. sanguineum bushes were growing in this place. These were on the steep south and southwest facing slope that formed the east bank of the stream. The slope is sparsely covered with other vegetation and fallen logs. In some places there are bare, loose patches of rock.

Procedure: The R. sanguineum bushes on the plot were pulled, and then each bush, or part of bush, was partly buried in the ground in as many different ways, and in as many different kinds of locations as possible, the idea being to imitate all possible methods by which

(3) To determine how rapidly and extensively *H. lacustre* comes in this kind of place, after eradication.

(3) To determine the probability of spread from unmarketed to eradicated territory.

(4) To find the possible cost of the eradication of Mites on the numerous hillslope streams. The major part of the Mites on many such slopes are found along these streams, making the stream much the greatest factor in eradication.

Method of Operations: The plots will be examined over very carefully for Mites, and account taken of every Mites found, whether from larvae, crown sprouts or seeds. Observation will also be made on rate of growth of bushes arising from the different sources.

In addition the site of a small patch of *L. procumbens* eradicated from Plot 3 will be checked carefully to note any appearance of seedlings or sprouts.

Results: The one square chain in Plot 8 yielded 55 *H.* lacustre or 880 bushes per acre. The amount of live stem was 3.3 feet or 52,780 per acre. The total labor was 8½ man-days or 82.5 man-days per acre.

The 2 square chains in Plot 9 yielded 249 *H. lacustre* and 3 *H. procumbens* or 1,750 bushes per acre. The amount of live stem was 10,208 feet or 82,040 feet per acre. Practically 40 feet making a total of 10,608 feet or 82,040 feet of live stem per acre. 8½ man-days were required for the .3 acres or 41 man-days per acre.

The total for the two plots was 600 Mites and 13,386 feet of live stem. 10½ man-days were required for the .3 acres making 35 man-days per acre or .028 acres per man-day. Assuming that the plots are a fair example of the whole stream, it would take a crew of six men 18½ days (93 man-days) to eradicate the whole stream.

Density of plot No. 10

This plot of irregular shape, 1,320 by 33 chains, is located below the lower edge of eradication area No. 2 along a small stream which flows most of the summer. It has an average altitude of about 3,600 feet, and is one-third of the way up the side of Tom, Dick and Harry Ridge. A large number of *L. procumbens* bushes were growing in this place. There were on the steep, adzed and cultivated facial slope that formed the east bank of the stream. The slope is sparsely covered with other vegetation and fallen logs. In some places there are bare, loose patches of rock.

Procedure: The *H. procumbens* bushes on the plot were rated, and then each bush, or part of bush, was partly buried in the ground as possible, the idea being to imitate all possible methods by which

bushes might become accidentally buried after eradication. The site of each of these partly-covered plants was marked by a numbered cedar stake, and a record kept of the method of dealing with each plant.

There was a total of 120 bushes of R. sanguineum on the plot. All were eradicated but only 100 were layered as this number should give reliable results. A few bushes of R. lacustre and R. bracteosum were not eradicated.

The object of this plot is to determine whether R. sanguineum will take root when parts of the plant are covered with soil, as might happen during eradication. All of the bushes will be checked over in the future to determine whether any have taken root.

Ecology Plot No. 11

Plot No. 11, .6X1.42 chains, is situated on a south-facing slope, near the lower edge of eradication area 1. A small stream spreads out here into a rather wide swampy area, and a heavy growth of alder, maple, fir, cedar, hemlock and spruce, with shrubs such as Vaccinium, Rubus parviflorus, Sorbus, Echinopanax, and herbs, as Asarum, Achlys, Trillium, Kruskia, Dicentra, Mitella, Linnea, Cornus canadensis, Clentonia, etc. Thus the site is shady and swampy.

This plot was laid out for the purpose of studying the reproduction of R. bracteosum by layering, after the roots were pulled out. The plot was eradicated by the crew, and the R. lacustre were pulled and piled as usual. The R. bracteosum were pulled, and a portion of their stems covered with earth. Fifty places were covered in this manner and were staked with numbered stakes. Ribes on the plot were as follows:

	R. lacustre	R. bracteosum
Total bushes	80	12
Total acres	.085	.085
Bushes per acre	952	14.3
Average height in ft.	1.6	5
Total live stem per acre	20,702	9,345
Average live stem per bush	21.6	65
Total live stem on plot	1,739	785

Object: (1) To determine whether R. bracteosum will regenerate by layering after eradication, as a result of accidental burying of parts.

(2) To determine amount and method of other types of reproduction, such as sprouting from old root pieces or stems overlooked in eradication and germination of stored seed.

There was a total of 120 bushes of *P. sempervirens* on the plot. All were eradicated but only 100 were layered as this number should give reliable results. A few bushes of *R. laevigata* and *P. praecoxum* were not eradicated.

The object of this plot is to determine whether *R. sempervirens* will take root when parts of the plant are covered with soil, as might happen during eradication. All of the bushes will be checked over in the future to determine whether any have taken root.

Plot No. 11

Plot No. 11, .6X1.42 chains, is situated on a south-facing slope, near the lower edge of eradication area 1. A small stream spreads out here into a rather wide swampy area, and a heavy growth of alder, maple, fir, cedar, hemlock and spruce, with shrubs such as *Vaccinium, Rubus parviflorus, Berberis, Rubus nivalis, and herbs, as Asarum, Achlys, Trillium, Tiarella, Disporum, Mitella, Linnea, Cornus canadensis*, Clintonia, etc. Thus the site is shady and swampy.

This plot was laid out for the purpose of studying the reproduction of *R. praecoxum* by layering, after the roots were pulled out. The plot was eradicated by the crew, and the *P. laevigata* were pulled and piled as usual. The *R. praecoxum* were pulled, and a portion of their stems covered with earth. Fifty pieces were covered in this manner and were staked with numbered stakes. Notes on the plot were as follows:

Total bushes	[illegible]
Total acres	.088
Bushes per acre	14.3
Average height in ft.	5
Total live stem per acre	9,845
Average live stem per bush	65
Total live stem on plot	785

Object: (1) To determine whether *R. praecoxum* will reproduce by layering after eradication, as a result of accidental burying of parts.

(2) To determine amount and method of other types of reproduction, such as sprouting from old root pieces or stems overlooked in eradication and germination of stored seed.

(3) To study the above points with particular reference to the type of habitat of this plot (i.e. very wet hillside bog, heavily covered with a large variety of herbs, shrubs, and trees.)

Future Data: (1) Check site of each plant and record data for each plant.

(2) Check entire plot carefully for seedling Ribes and new sprouts from old left over crowns and roots.

(3) Make careful checks of the shade conditions, and record as accurately as possible, for comparison with shade in future years.

Ecology Plot No. 12

No definite boundaries have been established for this plot. The plants (Ribes bracteosum) used in the experiment were in a clump situated on the bank of Still Creek, in such a way that the branches hung over the water in places.

Procedure: Some of the supposedly diseased Ribes bracteosum bushes from plot 6 were brought to camp, and an attempt made to inoculate the Ribes bracteosum bushes in this plot with the organisms causing the diseased condition in plot 6. Small fragments of wood were cut from the diseased plants at points where the organisms would apparently be, and these fragments were introduced into small cuts and bruises on the stems of the Ribes bracteosum plants in plot 12. A small piece of heavy cord was tied firmly to the bush, at the point where the inoculation was attempted.

Object: (1) To experiment with the possibilities of inoculating other Ribes bracteosum plants with the disease found in Plot 6. (Ceriospora ribis)

Future observations and work: (1) Check all plants in plot very carefully for possible results from the attempted inoculations.

(2) Make further attempts at inoculation, on this and other selected sites. Make these inoculations both at beginning and at end of the field work in the Still Creek area.

(3) Make culture inoculations on agar of oranism causing disease.

Note: Culture inoculations on agar and sweet clover stems were made by Dr. Zeller. Both resulted in pronounced growth of the fungus and the production of conidiospores. More is to be done on this interesting fungus to determine certainly its identity and its parasitic character, if it has such.

(3) To study the scrub points with particular reference to the type of habitat of this plot (i.e. very wet hillside bog, heavily covered with a large variety of herbs, shrubs, and trees.)

Permit Data: (1) Check site of each plant and record data for each plant.

(2) Check entire plot carefully for seedling Ribes and new sprouts from old leaf over crowns and roots.

(3) Make careful checks of the shade conditions, and record as accurately as possible, for comparison with shade in future years.

Study Plot B, 12

No definite boundaries have been established for this plot. The plants (Ribes bracteosum) used in the experiment were in a clump situated on the bank of Still Creek, in such a way that the branches hung over the water in places.

Procedure: Some of the supposedly diseased Ribes bracteosum bushes from plot B were brought to camp, and an attempt made to inoculate the Ribes bracteosum bushes in this plot with the organisms causing the diseased condition in plot B. Small fragments of wood were cut from the diseased plants at points where the organisms would apparently be, and these fragments were introduced into small cuts and bruises on the stems of the Ribes bracteosum plants in plot 12. A small piece of heavy cord was tied firmly to the bush, at the point where the inoculation was attempted.

Object: (1) To experiment with the possibilities of inoculating other Ribes bracteosum plants with the disease found in plot B. (Cercospora ribis)

Future observations and work: (1) Check all plants in plot very carefully for possible results from the attempted inoculations.

(2) Make further attempts at inoculation, on this and other selected sites. Make these inoculations both at beginning and at end of the field work in the Still Creek area.

(3) Make culture inoculations on agar of organism causing disease.

Note: Culture inoculations on agar and sweet clover stems were made by Dr. Zeller, both resulted in pronounced growth of the fungus and the production of conidiospores. More is to be done on this interesting fungus to determine certainly its identity and its parasitic character if it has such.

C. Scouting and Reconnaissance

The region contiguous to the Still Creek area was scouted thoroughly to determine the abundance, condition and age of white pine and the different Ribes species occurring in this region.

The Still Creek area itself is covered in the recommendations for eradication work.

Along the crest of the ridge above Veda Lake there is a belt of young timber, about 50 per cent of which is white pine. The oldest trees are 18 to 20 years though all ages below 20 years are represented in this stand which is nearly or quite Ribes-free.

On the south side of this ridge a stand of reproduction, 25 per cent white pine, extends west for half a mile. This stand is Ribes-free though a few large R. lacustre bushes were found near its western edge in a heavily burned strip. R. lacustre and R. bracteosum were found along the foot and sides of cliffs higher up the ridge.

R. lacustre occurs at frequent intervals along the ridge toward Kinset Lake and from Kinset Lake to Devil's Peak R. sanguineum, R. lacustre, R. viscosissimum and R. bracteosum are abundant along the ridge and down each side for the short distance scouted. The finding of R. bracteosum high up on rather dry rocks indicates that this species can be propagated by seed in other places than stream bottoms.

A very good 25 per cent stand of white pine, about 10 to 15 feet high extends for half a mile north from Kinset Lake.

A reconnaissance strip was run in the Mud Creek and Salmon River area, for the purpose of estimating the number of P. monticola and Ribes per acre in the area. This should be an index to the pines and Ribes in this section.

The area is a ridge located between the Salmon River and Mud Creek to the southeast of Summit Ranger Station. The timber is about 25 per cent white pine with the other timber a mixture of lodge pole, white fir, and hemlock. There are sufficient white pine seed trees to seed the area to pine within a few years.

A reconnaissance strip 1/4 chain wide was run for a distance of 80 chains. All white pine were tallied and data taken on all Ribes bushes. The strip was started about 3 chains west of the junction of

7. Juvenile and Transitional

The region contiguous to the Still Creek area was scouted thoroughly to determine the abundance, condition and age of white pine and the different Ribes species occurring in this region.

The Still Creek area itself is covered in the recommendations for eradication work.

Along the crest of the ridge above Fade Lake there is a belt of young timber, about 30 per cent of which is white pine. The oldest trees are 18 to 20 years though all ages below 20 years are represented in this stand which is nearly or quite Ribes-free.

On the south side of this ridge a stand of reproduction, 25 per cent white pine, extends west for half a mile. This stand is Ribes-free though a few large R. lacustre and R. bracteosum were found along the foot and sides of cliffs higher up the ridge.

R. lacustre occurs at frequent intervals along the ridge toward Sunset Lake and from Kinnet Lake to Devil's Peak C. sanguineum, R. lasiocarpum, R. viscosissimum and R. bracteosum are abundant along the ridge and down each side for the short distance scouted. The finding of R. bracteosum high up on rather dry rocks indicates that this species can be propagated by seed in other places than stream bottoms.

A very good 25 per cent stand of white pine, about 10 to 15 feet high extends for half a mile north from Kinnet Lake.

A reconnaissance strip was run in the Bum Creek and Salmon River area, for the purpose of ascertaining the number of R. montigola and Ribes per acre in the area. This should be an index to the pines and Ribes in this section.

The area is a rid located between the Salmon River and Bum Creek to the southeast of Summit Ranger Station. The timber is about 25 per cent white pine with the other timber a mixture of lodge pole, white fir, and hemlock. There are sufficient white pine seed trees to seed the area to pine within a few years.

A reconnaissance strip 1/4 chain wide was run for a distance of 80 chains. All white pine were tallied and data taken on all Ribes bushes. The strip was started about 3 chains west of the junction of

the Clackamas Lake trail and the old Salmon River meadows road, running south 50 degrees east, 27 chains, then south 30 degrees west, 53 chains. The pines tallied ranged from small seedlings less than one foot high to the largest, which were about 12" diameter and about 40 feet high. Total pines per acre were 148, with about 7 per acre that were 10 to 12" in diameter. A few of the pines are infested with Leader weevil but for the most part are in good health. Only one Ribes was located in the strip. This was a Ribes viscosissimum bush, 4 feet high, 9 years old, and having 100 feet of live stem. making an average of 0.5 Ribes per acre.

A scouting trip around the edge of the area revealed some R. lacustre along the Clackamas lake trail and along Mud Creek, some R. lacustre along the Salmon River and also along the road in springy places; a few R. triste were found along Mud Creek, but no dense stands of any Ribes were discovered in the vicinity.

Report of Ribes Conditions on Northwest Facing Slope, Still Creek Area, 1927

A reconnaissance strip was started on the side of Eureka mountain and extended around the contour for a distance of 40 chains on Eureka and 40 chains on the next mountain west. The strip was 1/4 chain wide. It thus included one acre on each mountain. The two hillsides appear similar, but the Ribes conditions are very different. Both are old burn dry hillside type.

Ribes found on the acre on Eureka mountain are as follows:

	R. sanguineum	R. viscosissimum
Number of bushes	81	12
Total live stem	2,840 feet	2,040 feet
Average height	3.5 feet	3 feet
Average age	6 years	7 years
Maximum age	12 years	12 years

Total number of bushes 33
Total live stem 4,880

No Ribes were found on the slope of the next mountain.

Report of Ribes Conditions on Southeast Facing Slope, Still Creek Area, 1927

There were two eradication areas worked on the southeast-facing slope in this locality, but as an additional check it was thought best to run reconnaissance strips between the two plots. This was done by running a strip 1/8 chain wide for a distance of 40 chains

the Glacismere Lake trail and the old Salmon River meadows road, running south 80 degrees east, 47 chains, then south 30 degrees west, 83 chains. The plums tallied ranged from small seedlings less than one foot high to the largest, which were about 18" diameter and about 40 feet high. Total plums per acre were 148, with about 7 per acre that were 10 to 18" in diameter. A few of the plums are infested with leader weevil but for the most part are in good health. Only one Ribes was located in the strip. This was a Ribes viscosissimum bush, 4 feet high, 3 years old, and having 100 feet of live stem, making an average of 0.8 Ribes per acre.

A scouting trip around the edge of the area revealed some R. lacustre along the Glacismere Lake trail and along Red Creek, some R. lacustre along the Salmon River and also along the road in spring places; a few R. triste were found along Red Creek, but no dense stands of any Ribes were discovered in the vicinity.

Report of Ribes Conditions on Bitterroot Public Lands, 1931 Fred Morris, Ass't

A reconnaissance strip was started on the side of Bureka mountain and extended around the contour for a distance of 40 chains on Bureka and 40 chains on the next mountain west. The strip was 1/4 chain wide. It thus included one acre on each mountain. The two hillsides appear similar, but the Ribes conditions are very different. Both are old burn dry hillside type.

Ribes found on the acre on Bureka mountain are as follows:

	R. sanguineum	R. viscosissimum
Number of bushes	81	12
Total live stem	2,840 feet	2,040 feet
Average height	3.5 feet	3 feet
Average age	8 years	7 years
Maximum age	12 years	12 years

Total number of bushes 93
Total live stem 4,880

No Ribes were found on the slope of the next mountain.

Report of Ribes Conditions on Bitterroot Public Lands, 1931
Fred Morris, Ass't

There are two qualifications placed on the conclusions-facts given in this report, but as an additional check it was thought that it was reconnaissance stripe between the two plots. This was done by running a strip 1/8 chain wide for a distance of 40 chains

between the plot, then dropping down hill 10 chains and running another strip 1/8 chain wide. This makes a total of one acre of ground covered in the two strips. This slope is dry hillside type of a 1917 burn and is planted to white pine and fir. These strips were run in the area just above the camp site. The majority of the Ribes found were in the small swales or draws.

Eight R. sanguineum were found with a total of 825 feet of live stem. The average height was 4½ feet; average age, 9½ years; maximum age, 13 years.

Some showed a small amount of dead stem, and nearly all were well fruited.

D. Recommendations for Eradication Work on Still Creek Planted Area, Oregon 1927

Immediately north of the camp site is an area of 1918 planting which is largely white pine that will be fairly easily worked. A few small streams course down through it which will work rather slowly, probably not over 0.1 acre per man-day, but there would not be over 5 acres of this type. There are around 160 acres of this type that is open hillside, which could be worked out at the rate of 3 acres per man-day if the crew were experienced.

Immediately west and northwest of camp, the planting is all Douglas Fir, but higher up the side of the mountain, approximately 1/2 mile, is another area of mixed white pine of about 160 acres that has some streams in it that grow rather heavy Ribes. These streams might better be worked by chemical eradication. Other than the streams, the area is fairly open hillside that will work out about 3 acres per man-day.

The area on the south side of Still Creek is considerably different. One fairly large stream type runs down from the saddle west of Eureka Mountain, which comprises probably 30 acres of stream type that could be worked at about 0.5 acres per man-day with fair efficiency. It might be much cheaper to eradicate the more concentrated areas by chemicals, after which the balance would go much faster.

Around the slopes of Eureka Mountain is a large area of white pine, comprising around 300 acres that is largely brushy hillside, and from the superficial reconnaissance, there appears to be numerous large Ribes of R. sanguineum and R. viscosissimum. Not sufficient of this type was worked to make any close estimate of the time, but it would likely not go faster than 1.5 acres per man-day on the average for the 300 acres. As there are a few small drainage streams on the north side of Eureka Mountain, which have a heavy stand of Ribes, it might be better to eradicate the concentrated areas of these by chemicals.

Height 9. Specimens were found with a total of 885 feet of live stem. The average height was 45 feet; average age, 39 years; maximum age, 78 years.

Trees showed a small percent of dead stem, and nearly all were well [illegible].

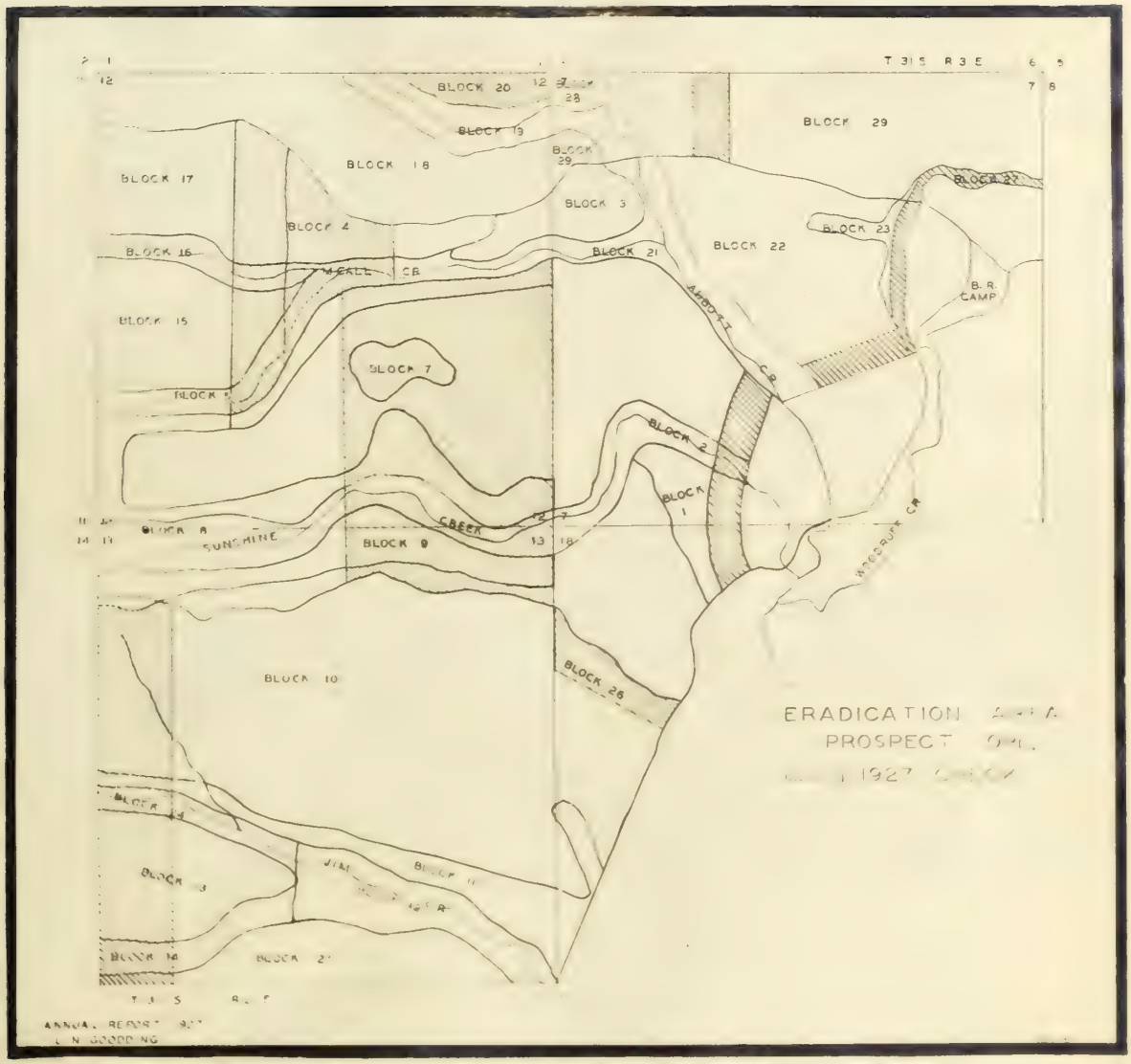
[illegible]

Immediately west of the camp site is an area of 1814 planting which is largely only that it can be fairly readily restocked. A few small strips could be cut [illegible] probably not more than 1/2 mile. Other areas of this type exist, but will be small and scattered.

Immediately west and southwest of camp, the planting is all Douglas fir, but higher up the side of the mountain, approximately 1/2 mile, is another area of mixed white pine of about 160 acres that has some streams in it that grow rather heavy ribbs. These streams might better be worked by chemical eradication. Other than the streams the area is fairly open hillside that will work out about 8 acres per man-day.

The area on the south side of Hill Creek is quite [illegible] different. One fairly large stream type runs down from the saddle west of Eureka Mountain, which comprises probably 30 acres of stream type that could be worked at about 0.5 acres per man-day with fair efficiency. It might be much cheaper to eradicate the more concentrated areas by chemicals, after which the balance would go much faster.

Around the slope of Eureka Mountain is a large area of white pine, comprising around 300 acres that is largely brushy hillside, and from the superficial reconnaissance, there appears to be numerous [illegible] lies of [illegible] Eradication. Not sufficient of this type was worked to make any close estimate of the time, but it would likely not be faster than 1.5 acres per man-day on the average for the 300 acres. As there are a few small drainage streams on the north side of Eureka Mountain, which have a heavy stand of ribes, it might be better to eradicate the concentrated areas of these by chemicals.


T 31 S R 3 E
BLOCK 20
BLOCK 19
BLOCK 29
BLOCK 18
BLOCK 17
BLOCK 4
BLOCK 3
BLOCK 16
BLOCK 21
BLOCK 22
BLOCK 23
B. R. CAMP
BLOCK 15
BLOCK 7
BLOCK 2
BLOCK 1
BLOCK 8
SUNSHINE
CREEK
BLOCK 9
BLOCK 10
BLOCK 26
BLOCK 3
BLOCK 14
BLOCK 2
T 3 S
ERADICATION
PROSPECT
1927
ANNUAL REPORT
L. N. GOODING

West of the saddle on the west side of Eureka Mountain, there is some white pine on the higher ground near the ridge. It is rather difficult to estimate the acreage but as it extends in a rather narrow strip from Eureka Mountain west to Veda Lake, the total would likely be in excess of 200 acres including the adjoining area which would need to be eradicated. Most of this is rather brushy, but fairly free of Ribes on the hillside type. It would likely work out at the rate of 5 acres per man-day. The small streams, such as those draining Veda Lake, are grown to a heavy stand of R. bracteosum and R. lacustre and work out extremely slowly by crew, probably not over 0.05 acres per man-day. I do not know the acreage of this type, but it would likely be in excess of 10 acres.

Adjoining Still Creek to the south of camp and west, there is no white pine planted.

The expensive part of the eradication on this site is along the stream. Elsewhere Ribes are few except on a comparatively few sites.

The southwest slope of Eureka Mountain has an abundance of Ribes viscosissimum and R. sanguineum, and the high ridges throughout the area are danger spots. The greatest mass of Ribes on the entire area is below Veda Lake. This could only be handled by chemicals, and many other stream types doubtless could be worked better by chemicals than by hand pulling. Much of the stream type offers too small an amount of Ribes to warrant chemical eradication, but too much to make hand pulling anything but slow and tedious. Chemical eradication should be tried on R. bracteosum in this region, and doubtless costs could be lowered by using this method. The entire cost for eradicating Ribes in this region should be between $2,500 and $3,000, unless it proved necessary to eradicate the great masses of R. bracteosum below Veda Lake by hand, in which case the cost would be considerably higher.

4. Prospect Area 1927

The camp was set up at Woodruff Meadows Ranger Station on the same ground that was occupied in 1925.

The purpose of the 1927 operation was to recheck the area that had been worked over in 1925, endeavoring to discover the probable benefits of the 1925 work, its success according to the best known ideas of success, and the points of weakness. Besides this the eradication men were called upon from time to time to do some extensive and intensive ecology work.

and intensive ecology work.

ication men were called upon from time to time to do some extensive ideas of success, and the points of weakness. Besides this the eradi- benefits of the 1935 work, like success according to the best known that had been worked over in 1935, endeavoring to discover the probable

The purpose of the 1937 operation was to recheck the area

the same ground that was occupied in 1935.

4. Prospect Area 1937

The camp was set up at Woodruff Meadows Ranger Station on

Vega Lake by boat, in which case the cost would be considerably higher. Pteleaf necessary to eradicate the great masses of R. bracteosum below Ribes in this region should be between $2,500 and $3,000, unless it could be lowered by using this method. The entire cost for eradicating should be tried on R. bracteosum in this region, and doubtless costs could be lowered by using anything but slow and tedious. Chemical eradication amount of Ribes to warrant chemical eradication, but too much to than by hand pulling. Much of the stream type offers too small an and many other stream types doubtless could be worked better by chemicals area is below Vega Lake. This could only be handled by chemicals, the area are danger spots. The greatest mass of Ribes on the entire Ribes viscosissimum and R. sanguineum, and the high ridges throughout

The southwest slope of Eureka Mountain has an abundance of

the stream. Elsewhere Ribes are few except on a comparatively few sites.

The expensive part of the eradication on this site is along

Adjoining Still Creek to the south of camp and west, there is no white pine planted.

acreage of this type, but it would likely be in excess of 10 acres. crew, probably not over 0.05 acres per man-day. I do not know the of R. bracteosum and R. leucarpa and work out extremely slowly by streams, such as those draining Veda Lake, are prone to a heavy stand would likely work out at the rate of 5 acres per man-day. The small rather brushy, but fairly free of Ribes on the hillside type. It ing area which would need to be eradicated. Most of this is total would likely be in excess of 300 acres including the adjoin- rather narrow strip from Eureka Mountain west to Veda Lake. The is rather difficult to estimate the acreage but as it extends in a there is some white pine on the higher ground near the ridge. It

West of the saddle on the west side of Eureka Mountain,

Naturally, the best method of rechecking this area and getting desired information would have been to go over the whole area. As camp was not set up until late in the summer, it was impossible to go over the whole ground. The next best plan that was decided upon was to work representative areas of all blocks and types.

Most of the work was done by a five-man crew in close formation with one checker. The crew was operated with the idea of very efficiently covering the ground, and at the same time covering a reasonable amount of territory. One block (#26) that showed very few Ribes in 1925 was run over by scouts merely to see if any old Ribes had been left. All of the blocks were worked except Nos. 18, 25 and 12. No. 18 was not reworked because it showed so few Ribes in 1925 that a recheck was not considered essential. Nos. 25 and 12 were not reworked for lack of time.

Due to the location and shape of the blocks, it was sometimes more convenient to work two or three blocks together. This was done in several instances. When such a plan was used, the crew foreman kept separate data sheets for each block. He could very closely estimate where one block ended and another began. In figuring the man-days per block-acre, it was necessary to estimate the amount of time used on each block.

The amount reworked on the several blocks varied from only a small fraction up to 90%, depending on the size of the block and the need of rechecking it. The total area reworked was 406 acres as nearly as can be estimated, which is 21.6% of the total 1925 area.

The corners of all blocks were marked with aluminum tags usually tacked on a convenient tree, which was then brushed around so that it could be more readily located. Stakes and small trees were used to mark the corners of the reworked areas. These stakes were labelled with blue pencil, which will remain legible for two to three years, by which time they will need to be replaced if a ground record is desired. A careful map was kept of the area reworked, and this was reproduced by cross-hatching over the original map, so that the approximate location of the reworked areas can always be found.

As the purpose of the operation was partly to do some ecological scouting and reconnaissance work, in addition to establishing some intensive ecology plots, a part or all of the crew was taken from eradication at times to do needed ecology work. The ecology work included scouting trips to Diamond Lake, Crater Lake, and the Oregon Caves regions, to Brown's Cabin Ranger Station and vicinity, to various points close to camp, and the work included many permanent ecology plots for Ribes study, reports of which are written up separately.

As the purpose of the operation was partly to do some ecological scouting and reconnaissance work, in addition to establishing some laboratory ecology plots, a part or all of the crew was taken from overflection at times to do needed ecology work. The ecology work included scouting trips to Diamond Lake, Crater Lake, and the Cascade regions, to Brown's Cabin Ranger Station and vicinity, to various points close to camp, and the work included many permanent ecology plots for Rikes study, reports of which are written up separately.

Naturally, the best method of reclaiming this area and getting desired information would have been to go over the whole area. In camp was not set up until late in the summer, it was impossible to go over the whole ground. The next best plan that was decided upon was to work representative areas of all blocks and types.

Most of the work was done by a five-man crew in close formation with one checker. The crew was operated with the idea of very efficiently covering the ground, and at the same time covering a reasonable amount of territory. One block (#36) that showed very few Rikes in 1938 was run over by scouts merely to see if any old Rikes had been left. All of the blocks were worked except Nos. 18, 25 and 13. No. 18 was not reworked because it showed so few Rikes in 1938 that a recheck was not considered essential. Nos. 25 and 13 were not reworked for lack of time.

Due to the location and shape of the blocks, it was sometimes more convenient to work two or three blocks together. This was done in several instances. When each a pi-s was dead, the crew foreman kept separate data sheets for each block. He could very closely estimate where one block ended and another began. In figuring the man-days per block-acre, it was necessary to estimate the amount of time used on each block.

The amount reworked on the several blocks varied from only a small fraction up to 90%, depending on the size of the block and the need of reclaiming it. The total area reworked was 406 acres as nearly as can be estimated, which is 31.6% of the total 1288 area.

The corners of all blocks were marked with aluminum tags neatly tacked on a convenient tree, which was then brushed around so that it could be more readily located. Stakes and small trees were used to mark the corners of the reworked areas. These stakes were labelled with blue pencil, which will remain legible for two to three years, by which time they will need to be replaced if a ground record is desired. A careful map was kept of the area reworked, and this was reproduced by cross-hatching over the original map, so that the approximate location of the reworked areas can always be found.

Considerable time was spent by some members of the camp in collecting specimens of the flora of the region, especially Ribes, and making large collections of Ribes roots, leaves and fruits for future study.

The special Grossularia klamathensis plot near camp was made an object of special study and was gone over very thoroughly by the eradication crew. The results are shown in the accompanying table. It is interesting to note that many more of the seeds sprouted in 1927 than in 1926. This species of Ribes was found both here and in other blocks to be very susceptible to layering and sprouting from pieces of shoots left lying on the ground.

Some of the general features brought out by the work are that there is a little more tendency to miss Ribes sanguineum than other species, that R. lacustre and G. klamathensis are more likely to produce seedlings and layer sprouts than others, due probably, to their wetter habitat, and that R. sanguineum must be carefully removed because if any of the crown is left, it will send up new shoots.

The creek types were most efficiently worked in 1925, probably due to close formation of the crews and slower operation. Areas that were worked by scouts in 1925 did not show up very well. If the number of bushes on these areas is sufficient to spread blister rust, scouting is not sufficient to remove them, as in very few cases will the scouts get as much as 50% of the bushes. Most of the results of the scouted blocks shows that this type of work is valueless except as a means of estimating the number of Ribes present.

A. Eradication 1927

Block No. 1

This block is of mixed types lying between Sunshine Creek and Little Bear Camp Trail, and is largely old brushy burn. This was one of the first blocks to be worked in 1925. A narrow strip on the east side of the block was reworked.

Total acres in block, 105. Acres reworked, 10.

Comparison given as per cent of 1925 work (per acre):

15	R. sanguineum	1.5 per acre - 10% of 1925 work
41	G. lobbii	4.1 per acre - 147% of 1925 work
2	R. lacustre	0.2 per acre - 4% of 1925 work
1	G. klamathensis	0.1 per acre - none found in 1925 work
1	G. binominata	0.1 per acre - none found in 1925 work

Considerable time was spent by some members of the camp in collecting specimens of the flora of the region, especially Ribes, and making large collections of Ribes roots, leaves and fruits for future study.

The special Pinetum Silvestre plot near camp was made an object of special study and was gone over very thoroughly by the eradication crew. The results are shown in the accompanying table. It is interesting to note that many more of the seeds sprouted in 1934 than in 1935. This species of Ribes was found both here and in other places to be very susceptible to layering and sprouting from pieces of shoots left lying on the ground.

Some of the general features brought out by the work are that there is a little more tendency to miss Ribes sanguineum than other species, that R. lacustre and R. glandulosum are more likely to produce seedlings and layer sprouts than others, and probably, to their better habitat, and that R. sanguineum must be carefully removed because if any of the crown is left, it will send up new shoots.

The crews types here most efficiently worked in 1935, probably due to close formation of the crews and slower operation. Areas that were worked by scouts in 1935 did not show up very well. If the number of bushes on these areas is sufficient to spread blister rust, scouting is not sufficient to remove them, as in very few cases will the scouts get as much as 50% of the bushes. Most of the results of the scouted blocks shows that this type of work is valueless except as a means of estimating the number of Ribes present.

6. Description [illegible]

Block No. 1

This block is of mixed types lying between Smashing Creek and Little Bear Camp Trail, and is largely old burnby burn. This was one of the first blocks to be worked in 1935. A narrow strip on the east side of the block was reworked.

Total acres in block, 105. Acres reworked, 10.

Comparisons given as per cent of 1935 work (per acre):

15	R. sanguineum	1.5 per acre = 10% of 1935 work
40	R. lobbii	4.1 per acre = 147% of 1935 work
3	R. lacustre	0.3 per acre = 4% of 1935 work
1	R. glandulosum	0.1 per acre = none found in 1935 work
1	R. bloomianis	0.1 per acre = none found in 1935 work

Block No. 2

This is a mixed block, being mostly old brushy burn, located between Abbott Creek and Sunshine Creek. A narrow strip was worked along the east side of the block. This was the last block that was reworked, and rainy weather cut the work shorter than was desired. However, sufficient acreage was covered to give some estimate of conditions.

Total acres in block, 113. Acres reworked, 8.

Comparisons based on per cent of 1925 results (per acre)

121	R. sanguineum	15 per acre	= 52% of 1925 work
49	G. lobbii	6 per acre	= 254% of 1925 work
11	R. lacustre	1.4 per acre	= 15.5% of 1925 work
2	G. klamathensis.	.25 per acre	= none found 1925
		Total Ribes 23 per acre	= 56% of 1925 work

The results indicate that this block was too much slighted in the 1925 work. About one-half as many R. sanguineum were found in 1927 as in 1925, and they were mostly old bushes. The G. lobbii found also shows that much more careful work is necessary for any satisfactory eradication.

Block No. 3

Bottom Land, Mature Timber Type

This block is a very brushy block and originally had many large R. sanguineum and G. lobbii bushes. A strip was reworked along the section line through the middle of the block, running south from Huckleberry Gap trail.

Total acres in block, 33. Acres reworked, 7.

Comparisons based on per cent of 1925 results (per acre)

11	R. sanguineum,	per acre 1.6	- 8.2% of 1925 results
5	R. lacustre	per acre 0.7	- 5.2% of 1925 results
2	G. lobbii	per acre 0.3	- 5% of 1925 results
	Total	per acre 2.5	- 6% of 1925 results

Time required, 6 man-days - 1.16 acres per man-day is a little faster than the area was worked in 1925. It would appear that this block is fairly clean of Ribes.

Block No. 1

Bottom land, Mature Timber Type

This block is a very brushy block and originally had many large R. sempervirens and R. lobbii bushes. A strip was reworked along the section line thrown the middle of the block, running south from Huckleberry Gap trail.

Total acres in block, 33. Acres reworked, 7.

Comparisons based on per cent of 1935 results (per acre)

11 R.	sempervirens	per acre 1.6	- 8.3% of 1935 results
5 R.	lacunbre	per acre 0.7	- 5.3% of 1935 results
3 R.	lobbii	per acre 0.3	- 3% of 1935 results
	Total	per acre 2.5	- 8% of 1935 results

Time required, 1 man-day - 1.16 acres per man-day is a little faster than the area was worked in 1935. It would appear that this block is fairly clean of Ribes.

Block No. 2

Total acres in block, 118. Acres reworked, 8.

Comparisons based on per cent of 1935 results (per acre)

138 R.	sempervirens	15 per acre	= 35% of 1935 work
49 R.	lobbii	6 per acre	= 45% of 1935 work
11 R.	lacunbre	1.4 per acre	= 13.3% of 1935 work
3 C.	Ribes vitis.	.25 per acre	= none found 1935
	Total Ribes	25 per acre	= 35% of 1935 work

The results indicate that this block was too much slighted in the 1935 work. About one-half as many R. sempervirens were found in 1937 as in 1935, and they were mostly old bushes. The R. lobbii found also shows that much more careful work is necessary for any satisfactory eradication.

Block No. 4

Brushy, Mature Timber Type

This block is rather heavily covered with brush. It is a south-facing slope lying between Huckleberry Gap trail and McCall Creek. Considerable area of this was worked in 1925 by scouts, and the results of this year's careful re-check are interesting. This seems to show rather conclusively that to try to work this type of area with spread formation scouts is worse than useless, because the number of bushes left is so much more than what are found, that the benefits of scout eradication are negligible. More than twice the R. sanguineum, nearly twice the R. lacustre, and as many G. lobbii, were found as in 1925.

Total acres in block, 28. Acres reworked, 20.

Comparisons based on per cent of 1925 results:

112	R. sanguineum per acre	5.6 =	233% of 1925 work.
25	R. lacustre per acre	1.2 =	171% of 1925 work
1	G. lobbii per acre	.1 =	100% of 1925 work
2	R. cereum per acre	.05 =	none found

The time of 1 acre per man-day is much slower than the scout work but would seem to be more consistent with desired results.

Block No. 5

This is a block of creek type located at the upper end of McCall Creek. About 1/2 the block was worked across the middle. As with other creek types, several Ribes lacustre seedlings, crown sprouts, and layer sprouts were found.

Total acres in block, 35. Acres reworked, 18.

Comparisons based on per cent of 1925 results (per acre)

43	R. sanguineum	2.4 per acre =	3% of 1925 results
77	R. lacustre	4.3 per acre =	6% of 1925 results
1	G. lobbii	0.05 per acre =	17% of 1925 results

Total 6.66 per acre = 4.6% of 1925 results.

Time required was 8 man-days, giving 2.2 acres per man-day, which is about 3 times as fast as the original working time.

Block No. 4

Small, Coarse Timber Type

This block is rather heavily covered with brush. It is a south-facing slope lying between Huckleberry Gap trail and McCall Creek. Considerable area of this was worked in 1938 by scouts, and the results of this year's careful re-check are interesting. This area with spread formation scouts is worse than useless, because seems to show rather conclusively that to try to work this type of the number of broken left is so much more than what are found, that the benefits of scout erection are negligible. More than twice the P. ponderosa, nearly twice the P. jacobsite, and as many D. Lobbii, were found as in 1938.

Total acres in block, 38. Acres reworked, 30.

Comparisons based on per cent of 1938 results:

112 P.	ponderosa	per acre	5.0 = 222% of 1938 work
38 P.	jacobsite	per acre	1.2 = 171% of 1938 work
1 D.	lobbii	per acre	.1 = 100% of 1938 work
2 P.	canus	per acre	.05 = none found

The time of 1 acre per man-day is much slower than the scout work but would seem to be more consistent with desired results.

Block No. 5

This is a block of creek type located at the upper end of McCall Creek. About 1/2 the block was worked across the middle. As with other creek types, several Ribes jacobsite seedlings, crown sprouts, and layer sprouts were found.

Total acres in block, 18. Acres reworked, 18.

Comparisons based on per cent of 1938 results (per acre)

43 P.	ponderosa	2.4 per acre	= 24% of 1938 results
77 P.	jacobsite	4.3 per acre	= 84% of 1938 results
1 D.	lobbii	0.05 per acre	= 17% of 1938 results

Total 6.65 per acre = 4.6% of 1938 results.

Time required was 8 man-days, giving 2.3 acres per man-day, which is about 3 times as fast as the original working time.

Block No. 6

Transitional Type

This block is a narrow strip of side hill with fairly mature timber and considerable brush. It joins the creek types along the south side of McCall Creek, and the north side of Sunshine Creek, and is connected at the west side of the section forming a U shaped block; the two ends of the U were reworked.

Total acres in block, 73. Acres reworked, 36.

Twenty-one R. sanguineum were found which equals,.6 Ribes per acre or 2% of the 1925 R. sanguineum, and 1.3% of the 1925 Total. Considering the large number of Ribes on the block originally, these results appear to be very satisfactory.

Block No. 7

This area is open mature timber, free from brush, and Ribes were not very numerous. The east half of the block was reworked.

Total acres in block 160. Acres reworked 80.

Comparison given in per cent of 1925 work (per acre):

62 R. sanguineum per acre	.8	57% of 1925 work
7 G. lobbii, per acre	.087	4.3% of 1925 work
4 R. lacustre, per acre	.05	7% of 1925 work
3 R. viscosissimum per acre	.04	2.5% of 1925 work
Total per acre	0.95	40% of 1925 work

These results show that the type of cover must be more thoroughly gone over if it is to be cleaned of Ribes. A crew, working in spread formation, does not get the Ribes. They also show that R. sanguineum must be carefully removed, as a larger percentage of bushes found were crown sprouts of R. sanguineum. In hard ground this currant must be dug out.

Block No. 8

Creek Type

The plot was located along Sunshine Creek. The east half of the block was reworked. Ribes found were mostly R. sanguineum, either crown sprouts on old missed bushes and mixed classes of R. lacustre.

Total acres in block, 54. Acres reworked, 26.

Comparison given as per cent of 1925 work (per acre):

Block No. 4

Description of Type

This block is a narrow strip of slope hill with fairly mature timber and considerable brush. It joins the creek types along the south side of Bodell Creek, and the north side of Sunshine Creek, and is connected at the west side of the section forming a U shaped block; the two ends of the U were reworked.

Total acres in block, 75. Acres reworked, 56.

Twenty-one *T. ampliflorum* were found which equals .9 Tibes per acre or 2% of the 1935 *R. sempervirens*, and 1.3% of the 1935 Total. Considering the large number of Tibes on the block originally, these results appear to be very satisfactory.

Block No. 7

This area is open mature timber, free from brush, and Tibes were not very numerous. The east half of the block was reworked.

Total acres in block 160. Acres reworked 80.

Comparison given in per cent of 1935 work (per acre):

62	*T. ampliflorum* per acre	.8	87% of 1935 work
7	*T. rabbii*, per acre	.007	4.3% of 1935 work
6	*R. lacunire*, per acre	.05	7% of 1935 work
3	*T. vicosissimum* per acre	.04	3.3% of 1935 work
	Total per acre	0.95	40% of 1935 work

These results show that the type of cover must be more thoroughly gone over if it is to be cleared of Tibes. A crew, working in spread formation, does not get the Tibes. They also show that *T. sempervirens* must be entirely removed, as a larger percentage of Tibes found were crown sprouts of *R. sempervirens*. In hard ground this current must be dug out.

Block No. 8

Description of Type

The plot was located along Sunshine Creek. The east half of the block was reworked. Tibes found were mostly *T. sempervirens*, either crown sprouts on old missed Tibes and mixed clumps of *T. lacunire*.

Total acres in block, 64. Acres reworked, 32.

Comparison given as per cent of 1935 work (per acre):

31	R. sanguineum	1.28	= 2% of 1925 work
30	R. lacustre	1.28	= 2% of 1925 work
	Total	2.5	= 1.6% of 1925 work

Five man-days were spent, giving 5.2 acres per man-day, which is several times faster than the original work. Considering the small number of bushes found compared to the original number, this block seems to have been well eradicated.

Block No. 9

Transitional Type

This block lies between Little Bear Camp Trail and Sunshine Creek. The east half of the block was reworked. This block had a heavy stand of R. sanguineum on it originally, and although a large number were found the second time, the percentage left was not high. The large number of crown sprouts shows that R. sanguineum must be dug out.

Results are as follows:

308	Total R. sanguineum	308	Total acres in block	48
1	Total R. lacustre	1	Acres worked	24
	Total R. lobbii	1	= 30%	
	Total	310		

Comparison given in per cent of 1925 work (per acre):

Ribes per acre 13 = 11% of the 1925 total, and
about 12% of 1925 R. sanguineum

A total of 9 man-days was used.

2.66 acres per man-day is considerably faster than the work was done in 1925, showing fairly satisfactory results for this type.

Block No. 10

This is a block of open, mature timber type. It is a large block, considerably cut up by deep ravines. For the most part it is fairly open. Most of the Ribes were found growing in the vicinity of a springy place. The area was largely worked by scouts in 1925, and the results of this year's check are noteworty, in that they show that the scouting work on the block was of no value. If the bushes found, which totaled 3 per acre, are important in rust control, it is important to have them removed. The scouts removed only 0.3 per acre, or 10%, which would be negligible in rust control.

31 R. sanguineum 1.38 = 3% of 1938 work
30 R. laevigatum 1.38 = 3% of 1938 work
Total 2.6 = 1.6% of 1938 work

Five man-days were spent, giving 8.9 acres per man-day, which is several times faster than the original work. Considering the small number of bushes found compared to the original number, this block seems to have been well eradicated.

Block No. 9

Translation Site

This block lies between Little Deer Camp Trail and Sunshine Creek. The east half of the block was reworked. This block had a heavy stand of R. sanguineum on it originally, and although a large number were found the second time, the percentage left was not high. The large number of crown sprouts above that R. sanguineum must be dug out.

Results are as follows:

Total R. sanguineum	308	Total acres in block	48
Total R. laevigatum	1	Acres worked	24
Total R. lobbii	1	= 30%	
Total	310		

Comparison given in per cent of 1938 work (per acre):

Ribes per acre 13 = 11% of the 1938 total, and
about 13% of 1938 R. sanguineum

A total of 9 man-days was used.

2.36 acres per man-day is considerably faster than the work was done in 1938, showing fairly satisfactory results for this type.

Block No. 10

This is a block of open, mature timber type. It is a large block, considerably cut up by deep ravines. For the most part it is fairly open. Most of the Ribes were found growing in the vicinity of a spring place. The area was largely worked by scouts in 1938, and the results of this year's check are noteworthy, in that they show that the scouting work on the block was of no value. If the bushes found, which totaled 6 per acre, are important in rust control, it is important to have them removed. The scouts removed only 0.3 per acre, or 10%, which would be negligible in rust control.

About 10% of the block was reworked.

Ribes found as follows:

R. sanguineum	95	-	2.8 per acre is 2800% of 1925 results
R. lacustre	3	-	0.1 per acre none found 1925
R. viscosissimum	1	-	0.03 per acre is 30% of 1925 results
G. lobbii	2	-	0.06 per acre is 200% of 1925 results
Total	101	-	3 per acre is 1000% of 1925 results

Block No. 13

Transitional Type

This area lies between the north and south forks of Jim Creek. A little more than one-third of the block on the west side was reworked.

Total acres in block, 58. Acres reworked, 22.

Comparison given as per cent of 1925 work (per acre)

Total per acre		1	=	19% of 1925 work
21 R. sanguineum	per acre	1	=	23% of 1925 work
1 R. lacustre	per acre	.045	=	28% of 1925 work

These results show that it requires more careful work for this type of cover than was used in 1925 to get all the Ribes.

Note: An analysis of the field sheets shows that the 23 bushes averaged less than 1 foot in height. There was, however, one bush four feet high and another two feet high. The total feet of live stem was 43.7 or 2 feet per acre. The question is, is it safe to leave 2 feet of live stem per acre? Leaving one bush 4 feet high is probably more serious than leaving several one foot high as in feet of live stem (this particular bush had 12 feet) it amounts to several smaller ones and also offers greater exposure to air currents.

Block No. 14

Creek Type

This block is located on the south fork of Jim Creek. About 1/3 of the west end of the block was reworked.

Total acres in block, 18. Acres reworked, 6.

Ribes found as follows:

R. americanum	95	=	3.8 per acre is 380% of 1925 results
R. lacustre	3	=	0.1 per acre none found 1925
R. vitosoisanum,	1	=	0.04 per acre is 80% of 1925 results
R. hudsonianum	2	=	0.08 per acre is 200% of 1925 results
Total	101	=	3 per acre is 1000% of 1925 results

Block No. 13

Transitional Type

This area lies between the north and south forks of Elm Creek. A little more than one-third of the block on the west side was removed.

Total acres in block, 88. Acres removed, 32.

Comparisons given as per cent of 1925 work (per acre)

Total per acre	1	=	197% of 1925 work
R. hudsonianum per acre	1	=	95% of 1925 work
R. lacustre per acre	.048	=	48% of 1925 work

Note: An examination of the field shows that the 32 bushes averaged less than 1 foot in height. There was, however, one bush four feet high and another two feet high. The total feet of live stem was 43.7 or 3 feet per acre. The question is, is it safe to leave 3 feet of live stem per acre? Leaving one bush 4 feet high is probably more serious than leaving several one foot high as is feet of live stem (this particular bush had 12 feet) it amounts to several smaller ones and also offers greater exposure to air currents.

These results show that it requires more careful work for this type of cover than was used in 1925 to get all the Ribes.

Block No. 14

Creek Type

This block is located on the south fork of Elm Creek. About 1/3 of the west end of the block was removed.

Total acres in block, 18. Acres removed, 8.

Comparison based on per cent of 1925 work.

62 R. sanguineum, per acre 10 = 30% of 1925 work
15 R. lacustre, per acre 2.5 = 3.5% of 1925 work
Total per acre 13 = 12% of 1925 work

These results are very consistent with those obtained in Block No. 24, which is creek type in a similar location. The 0.35 acres per man-day is somewhat slower than the time given for 1925 work.

Block No. 15

Brushy, Mature Timber Type

This block is located between McCall and "X" Creeks, on the west side of Section 12. A small portion across the east end was reworked.

Total acres in block, 65. Acres reworked, 10.

Comparisons based on per cent of 1925 results (per acre):

13	R. sanguineum	1.3 per acre	- 11% of 1925 results
2	R. lacustre	0.2 per acre	- 12.5% of 1925 results
6	G. lobbii	0.6 per acre	- 12.5% of 1925 results
	Total	2.1 per acre	- 10% of 1925 results

Time required is approximately the same as was required in 1925.

Block No. 16

Creek Type

This is a block of Creek Type located on the north fork of McCall Creek, marked on the map as "X" Creek; about 1/3 of the block was worked across near the middle. The results of the recheck on Creek Type blocks are in the main more satisfactory than other blocks.

Total acres in block, 14. Acres reworked, 5.

Comparisons based on per cent of 1925 work (per acre)

12	R. sanguineum	2.4 per acre	2% of 1925 results
13	R. lacustre	2.6 per acre	1.4% of 1925 results
1	R. viscosissimum	.2 per acre	20% of 1925 results
3	G. lobbii	0.6 per acre	15% of 1925 results
	Total	5.2 per acre	2% of 1925 results

Comparison based on per cent of 1928 work.

63 %. Manganese, per acre 1.9 = 90% of 1928 work
15 %. Iodine, per acre 5.8 = 5.8% of 1928 work
Total per acre 13 = 138 of 1928 work

These results are very consistent with those obtained in Block No. 14, which is creek type in a similar location. The 0.85 acres per man-day is somewhat slower than the time given for 1928 work.

Block No. 15

Trapp, Metro Tinsor Line

This block is located between McGall and "K" Creeks, on the west side of Section 12. A small portion across the east end was reworked.

Total acres in block, 65. Acres reworked, 10.

Comparisons based on per cent of 1928 results (per acre):

14 %.	Manganese	1.3 per acre - 114 of 1928 results
6 %.	Iodine	0.8 per acre - 13.8% of 1928 results
6 %.	Iron	0.6 per acre - 13.8% of 1928 results
	Total	2.1 per acre - 104 of 1928 results

Time required is approximately the same as was required in 1928.

Block No. 16

Trapp Line

This is a block of Creek Type located on the North Fork of McGall Creek, marked on the map as "I" Creek; about 1/2 of the block was worked across near the middle. The results of the reckoning on Creek Type blocks are in the main more satisfactory than other blocks.

Total acres in block, 14. Acres reworked, 5.

Comparisons based on per cent of 1928 work (per acre)

12 %.	Manganese	5.4 per acre	94 of 1928 results
13 %.	Iodine	8.6 per acre	1.4% of 1928 results
1 %.	Arsenic	.3 per acre	30% of 1928 results
5 %.	Iodoil	0.6 per acre	18% of 1928 results
	Total	8.3 per acre	34 of 1928 results

Time of 1 acre per man-day is considerable faster than 1925 time. As part of the 1925 work was done by scouts, it is difficult to make a comparison.

Note: Where the number of bushes per acre is very small the per cent comparison with the 1935 work is misleading.

Block No. 17

Brush and Reproduction Type

This block is rather brushy with Ceanothus and other brush and has some patches of heavy reproduction. Visibility is very poor, and some extremely large bushes of R. viscosissimum and R. sanguineum were scattered through the brush. The block is on a south-facing hillside. A portion across the east side of the block was reworked. 90% of bushes found were old missed bushes.

Total acres in block, 67. Acres reworked, 20.

Comparisons based on per cent of 1925 results (per acre)

6	R. sanguineum per acre	0.6	= 7% of 1925 results
1	R. lacustre per acre	0.05	= 17% of 1925 results
7	R. viscosissimum per acre	0.3	= 150% of 1925 results
5	G. lobbii per acre	0.25	= 250% of 1925 results
	Total per acre		25% of 1925 results

Time required 2.8 acres per man-day, is about 3 times as fast as original work. It is doubtful if the number of bushes present is sufficient to justify the time required to find them.

Block No. 19

This is a small block of creek type, located on the south fork of Abbott Creek, north of Huckleberry Gap trail. A portion of the northwest end of the block was reworked. Not many Ribes were found, and they were of mixed classes, no more than would normally be left in good work.

Total acres in block, 23. Acres reworked, 7.

Comparisons based on per cent of 1925 results (per acre)

6	R. sanguineum per acre	0.85	= 2.6% of 1925 results
17	R. lacustre per acre	2.4	= 5.3% of 1925 results
	Total per acre	3.3	= 4.2% of 1925 results

Time of 1 acre per man-day is considerable faster than 1928 time. As part of the 1928 work was done by scouts, it is difficult to make a comparison.

Note: Where the number of bushes per acre is very small the per cent comparison with the 1928 work is misleading.

Block No. 17

Brush and Reproductive Type

This block is rather brushy with Ceanothus and other brush and has some patches of heavy reproduction. Visibility is very poor, and some extremely large bushes of R. vitosaplanum and R. sanguineum were scattered through the brush. The block is on a south-facing hillside. A portion across the east side of the block was reworked. 90% of bushes found were old missed bushes.

Total acres in block, 67. Acres reworked, 30.

Comparisons based on per cent of 1928 results (per acre)

6 R.	sanguineum	per acre 0.6 = 7% of 1928 results
1 R.	lacustre	per acre 0.05 = 17% of 1928 results
7 R.	vitosaplanum	per acre 0.3 = 150% of 1928 results
5 O.	foliosi	per acre 0.25 = 850% of 1928 results
	Total per acre	38% of 1928 results

Time required 3.8 acres per man-day, is about 3 times as fast as original work. It is doubtful if the number of bushes present is sufficient to justify the time required to find them.

Block No. 18

This is a small block of creek type, located on the south fork of Abbott Creek, north of Huckleberry Jay trail. A portion of the northwest end of the block was reworked. Not many ribes were found, and they were of mixed classes, no more than would normally be left in good work.

Total acres in block, 33. Acres reworked, 7.

Comparisons based on per cent of 1928 results (per acre)

8 R.	sanguineum	per acre 0.85 = 8.4% of 1928 results
17 R.	lacustre	per acre 2.4 = 8.4% of 1928 results
	Total per acre 3.3	= 4.3% of 1928 results

A Total of 3½ acres per man-day is about 3 times as fast as 1925 work.

Block No. 20

This is a block of old, brushy, burn type in the northeast corner of Section 12, north of Huckleberry Gap trail. Nearly the whole block was reworked, with closer formation than was used in 1925. Results show that close formation work is required in brushy cover.

Total acres in block, 14. Acres reworked, 12.

Comparison based on per cent of 1925 results (per acre)

27	R. sanguineum	2.25 per acre	- 90% of 1925 results
16	R. lacustre	1.33 per acre	- 30% of 1925 results
2	G. lobbii	0.17 per acre	- 10% of 1925 results
	Total	3.75 per acre	- 44.6% of 1925 results

Time required was 3 acres per man-day. As this area was worked partly by scouts, no comparison on time of eradication can be made. The efficiency of scout eradication is shown to be low.

Block No. 21

This is a block of creek type located on Abbott and McCall Creeks. A strip was run along each bank of the stream, which is probably some of the worst of the block. Considering this fact, the results of finding but 4% of the Ribes found in 1925, indicated that this block was well worked. Several of the Ribes found were seedlings since 1925. Both R. lacustre and G. klamathensis seem to produce seedlings very generously.

Total acres in block, 25. Acres reworked, 9.

Comparisons based on per cent of 1925 results (per acre)

19	R. sanguineum	1 per acre	- 2% of 1925 results
53	R. lacustre	6 per acre	- 4% of 1925 results
8	G. lobbii	1 per acre	-10% of 1925 results
11	G. klamathensis	1.2 per acre	-50% of 1925 results
	Total	9 per acre	- 4% of 1925 results

The time of 1.3 acres per man-day is about 2½ times as fast as the 1925 work.

Block No. 22

Bottom Land, Mature Timber Type

This is a large block of bottom land, lying to the west of camp and adjoining Woodruff Creek. A narrow strip was run along the south side of the block. Some R. lacustre seedlings were

Total acres in block, 14. Acres reworked, 12.

Comparisons based on per cent of 1928 results (per acre)

37 B. sanguineum 2.28 per acre - 90¢ of 1928 results
19 B. lacunare 1.83 per acre - 36¢ of 1928 results
2 C. lobbii 0.17 per acre - 10¢ of 1928 results
Total 3.75 per acre - 44.6¢ of 1928 results

Time required was 3 acres per man-day. As this area was worked partly by scouts, no comparison on time of eradication can be made. The efficiency of countermedication is shown to be low.

Block No. 21

This is a block of creek type located on Abbott and McCall Creeks. A strip was run along each bank of the stream, which is probably some of the worst of the block. Considering this fact, the results of finding but 4% of the Ribes found in 1928, indicated that this block was well worked. Several of the Ribes found were seedlings since 1928. Both B. lacunare and C. Klamathensis seem to produce seedlings very generously.

Total acres in block, 32. Acres reworked, 8.

Comparisons based on per cent of 1928 results (per acre)

9 B. sanguineum 1 per acre - 3% of 1928 results
53 B. lacunare 8 per acre - 4% of 1928 results
8 C. lobbii 1 per acre -10% of 1928 results
11 C. klamathensis 1.3 per acre-30% of 1928 results
Total 8 per acre - 4% of 1928 results

The time of 1.3 acres per man-day is about ½ times as fast as the 1928 work.

Block No. 22

Bottom Land, Mature Timber Type

This is a large block of bottom land, lying to the west of camp and adjoining woodruff Creek. A narrow strip was run along the south side of the block. Some B. lacunare seedlings were

A Total of 3½ acres per man-day is about 3 times as fast as 1928 work.

Block No. 20

This is a block of old, brushy, burn type in the northeast corner of Section 12, north of Huckleberry Gap trail. Nearly the whole block was reworked, with closer formation than was used in 1928. Results show that close formation work is required in brushy cover.

found, and some crown and layering sprouts. No missed bushes were found.

Total Acres in block, 110. Acres reworked, 6.

R. lacustre 10 = 1.66 per acre

No comparisons can be made in this case with the 1925 work, because of lack of data. Certain portions of this block had a heavy stand of R. lacustre originally, but there is no data from 1925 to show how many.

Block No. 23

A strip one-half chain wide was eradicated along the west side of Woodruff Creek, from camp to Huckleberry Gap trail, totalling 1½ acres. This was eradicated by crew in close formation.

An estimation based on the area covered shows that the time spent in re-eradication was 120% of the 1925 work. However, these results might show up a little differently if the whole block had been reworked.

Total acres in block, 14. Acres reworked, 1½.

Comparison with 1925 work, (per acre:)

211	G. klamathensis	168.8 per acre	- 26% of 1925 work
4	R. lacustre	3.3 per acre	- 4.8% of 1925 work
	Total	172 per acre	- 23.8% of 1925 work

Block No. 24

Stream Type

For convenience in working, this block was worked in conjunction with adjoining blocks and the data kept separate. In this way the recheck area cut cross-wise of the original area, giving more representative data for the type. A little less than the west half of the block was reworked.

Total acres in block, 11. Acres reworked, 5.

Comparison based on per cent of 1925 work.

66	R. sanguineum	per acre 7	= 9% of 1925 work
52	R. lacustre	per acre 10	= 7% of 1925 work
		Total per acre 17.6	= 8% of 1925 work

These results seem to indicate that this type of creek can be successfully eradicated.

found, and some crawn and lapwing eggnuts. No mixed bushes were found.

Total Acres in block, 110. Acres remarked, 6.

B. Lacustre 10 = 1.66 per acre

No comparisons can be made in this case with the 1928 work, because of lack of data. Certain portions of this block had a heavy stand of B. lacustre originally, but there is no data from 1928 to show how many.

Block No. 23

A strip one-half chain wide was eradicated along the west side of Woodcliff Creek, from camp to Shickshinny Gap trail, totalling 1½ acres. This was eradicated by crew in close formation.

An estimation based on the area covered shows that the time spent in eradication was 130% of the 1928 work. However, these results might show up a little differently if the whole block had been remarked.

Total acres in block, 14. Acres remarked, 1½.

Comparison with 1928 work.(per acre:)

211 B. Filamentosis 168.8 per acre - 36% of 1928 work
4 B. lacustre 3.9 per acre - 4.8% of 1928 work
Total 172 per acre - 35.8% of 1928 work

Block No. 24

Stream Type

For convenience in working, this block was worked in connection with adjoining blocks and the data kept separate. In this way the reduced area cut cross-wise of the original area, giving more representative data for the type. A little less than the west half of the block was remarked.

Total acres in block, 11. Acres remarked, 5.

Comparison based on per cent of 1928 work.

35 B. filamentosum per acre 7 = 8% of 1928 work
24 B. lacustre per acre 10 = 7% of 1928 work
Total per acre 17.6= 8% of 1928 work

These results seem to indicate that this type of creek can be successfully eradicated.

Block Nos. 26 and 29

Block 26 was originally eradicated by the scout crew and was re-eradicated the same say. A strip 5 chains wide was run south and parallel to Little Bear Camp trail. No Ribes of any kind were found.

Block 29 was re-eradicated by crew. A strip 5 chains wide was run from a point on Huckleberry Gap Trail, 10 chains east of its junction with Abbott Creek, due north to section line between Section 6 and 7. No Ribes were found.

Block No. 27

Stream Type

A strip 1/2 chain wide was worked along the northwest side of Woodruff Creek from Huckleberry Gap trail to the point where the section line 7/8 crosses the creek.

Total acres in block, 5. Acres reworked, 1.

Comparison with 1925 work:

94	G. klamathensis	- 94 per acre -	47.2% of 1925
26	R. lacustre	26 per acre -	11.3% of 1925
	Total	120 per acre -	23.6% of 1925

Block No. 28

Stream Type

This is a small block of creek type, situated on Abbott Creek north of Huckleberry Gap trail. A narrow strip was worked along the creek banks. Results are average for the type.

Total acres in block, 18. Acres reworked, 3.6.

Comparisons based on per cent of 1925 results (per acre):

3	R. sanguineum	0.83	per acre	- 2.1% of 1925 results.
17	R. lacustre	4.7	per acre	- 9.2% of 1925 results.
1	G. lobbii	0.3	per acre	- 4.4% of 1925 results.
	Total	5.9	per acre	- 5.8% of 1925 results.

The time of 0.6 acres per man-day is a little slower than the 1925 time, but the hardest part of the block was reworked.

3. Ribes Eradication Report of 1/10 Acre Special R. klamathensis Plot, Prospect Area, Oregon, August 10, 1927

With the exception of two small ecology lots that were left by the ecology crew for special study, all of this plot was eradicated by the eradication crew. These two plots are 6 feet square.

Block No. 25 and 26

Block 25 was originally eradicated by the mount crew and was re-eradicated the same day. A strip 5 chains wide was run south and parallel to Little Deer Creek trail. No Mikes of any kind were found.

Block 26 was re-eradicated by crew. A strip 5 chains wide was run from a point on Huckleberry Gap Trail, 10 chains east of its junction with Alkali Creek, due north to section line between Section 6 and 7. No mikes were found.

Block No. 27

Stream Type

A strip 1/2 chain wide was worked along the northwest side of Packrat Creek from Huckleberry Gap trail to the point where the section line 7/8 crosses the creek.

Total acres in block, 5. Acres reworked, 1.

Comparison with 1938 work:

24	O. Plumethopsis	- 24 per acre =	47.3% of 1938
26	R. Lacustre	80 per acre =	11.8% of 1938
	Total	140 per acre =	36.4% of 1938

Block No. 28
Lotic Type

This is a small block of creek type, situated on Abbott Creek north of Huckleberry Gap trail. A narrow strip was worked along the creek banks. Results are average for the type.

Total acres in block, 18. Acres reworked, 0.6.

Comparisons based on per cent of 1938 results (per acre):

3	H. sanguinarum	0.66 per acre -	6.1% of 1938 results.
17	R. lacustre	4.7 per acre -	9.8% of 1938 results.
1	O. lobbii	0.8 per acre -	4.4% of 1938 results.
	Total	6.9 per acre -	6.8% of 1938 results.

The time of 0.6 acres per man-day is a little slower than the 1938 time, but the heaviest part of the block was reworked.

5. Mikes eradication Report of 1/10 acre Special 1. Plumethopsis Plot, Prospect Area, Clover, Plumas Co., Calif.

With the exception of two small ecology lots that were left by the ecology crew for special study, all of this plot was eradicated by the eradication crew. These two plots are 6 feet square.

With the exception of two small ecology plots that were left by the ecology crew for special study, all of this plot was eradicated by the eradication crew. These two plots are 6 feet square.

An interesting development of the plot is the fact that many more seedlings developed the second year after eradication than did the first year after. The majority of the seedlings grew either from under logs or in the edge of the grass where the ground was slightly shaded. An attempt was made to get all the seedlings both alive and dead, but doubtless many of the dead ones were over looked, as they were very small. A check earlier in the season would probably have shown more Ribes.

The table given below shows the results of the re-check.

TABLE NO. 11

1927 Seedlings		1926	1925	Crown	Layer		Total
Alive	Dead	Seedlings	Missed	Sprouts	Sprouts	Acres	Bushes
1,846	158	4	4	24	8	.1	2,024

Re-eradication Prospect Area, 1927

TABLE NO. 12

Comparison of Species Found

	Total	% of	1927 Seedlings		1926 Seedlings		1925 Missed		Crown Sprouts		Layer Sprouts	
Species	Number	Total	No.	%	No.	%	No.	%	No.	%	No.	%
R.sang.	1,014	54	6	0.6	37	3.8	600	59	341	33	30	3.6
R.lac.	385	21	57	15	35	9	105	28	118	30	70	18
C.klama.	319	17	268	84	22	7	18	6.5	7	1.5	4	1.0
C.lobbii	131	7	3	2	12	9	100	77	16	12		
R.visco.	12	1					12	100				
R.cereum	1	-					1	100				
C.bin.	1	-					1					
Total	1,863	100	334	18	106	6	857	45	482	25	104	6

* % refers to per cent of total in that species of Ribes; for example, 600 R. sanguineum is 59% of the total of 1,014.

With the exception of two small ecology plots that were left by the ecology crew for special study, all of this plot was eradicated by the eradication crew. These two plots are 6 feet square.

An interesting development of the plot is the fact that many more seedlings developed the second year after eradication than did the first year after. The majority of the seedlings grew either from under logs or in the edge of the grass where the ground was slightly shaded. An attempt was made to get all the seedlings both alive and dead, but doubtless many of the dead ones were over looked, as they were very small. A check earlier in the season would probably have shown more kinds.

The table given below shows the results of the re-check.

TABLE NO. 11

1947 Seedlings		1948	1949	Grown	Larger		Total
Live	Dead	Seedlings	Missed	Previous	Stature	Acres	Average
11,144	144	4	24	8	1		8,554

Re-eradication Project Area, 1947

TABLE NO. 12

Comparison of Species Found

Species	Number Total	% of Total	1947 Seedlings	1948 Seedlings	1948 Grown Previous	Larger Stature
A. sang.	1,014	8	64	47	54.8	50
A. jac.	324	27	17	15	17.3	10
A. mimo.	219	18	21	22	7	18
A. lobbii	131	7	3	15	3	12
A. vasc.	13	1				10
A. carn.	1					1
A. bic.	1					1
Total	1,703	100	105	99	82	102

* % refers to per cent of total in that species of Rubus; for example, 800 R. ursinum is 94% of the total of 1,014.

Table No. 13

Summary of Re-Eradication, Prospect Area, Oregon, 1927, by Blocks.

Block No.	R. sang.	R. lac.	R. visc.	R. cer.	C. lobb.	G. klam.	G. bin.	Total Bushes Pulled	No. of Bushes Missed	Crown or Layer Sprouts	No. of Seedlings	Bushes per acre 1925	Bushes per acre 1927	% of 1927 to 1925
1	15	3	-	-	41	1	1	60	58	-	2	23.6	6	25
2	151	11	-	-	19	2	-	183	134	30	19	41.1	23	56
3	11	5	-	-	2	-	-	18	7	10	1	45.7	2.5	6
4	118	35	-	1	2	-	-	140	75	58	7	5.2	7	212
5	45	77	-	-	1	-	-	131	46	55	20	148.1	6.66	4.6
6	21	-	-	-	-	-	-	21	16	5	-	44.7	.6	1.3
7	33	4	3	-	7	-	-	76	30	46	-	2.4	.95	40
8	31	30	-	-	1	-	-	62	17	21	24	144	3.4	1.6
9	303	1	-	-	1	-	-	310	116	173	21	113.3	13	11
10	91	3	1	-	3	-	-	101	88	12	1	.6	3	1000
13	21	1	-	-	-	-	-	22	19	3	-	5.9	1	34
14	62	15	-	-	-	-	-	77	46	25	6	70.66	13	18
15	15	2	-	-	4	-	-	21	16	4	1	30.4	2.1	10
16	12	13	1	-	3	-	-	29	18	7	4	315.4	5.8	2
17	3	1	7	-	5	-	-	16	13	1	-	4.1	1	24
19	6	17	-	-	-	-	-	23	6	11	7	78.7	3.3	4.2
30	27	16	-	-	3	-	-	46	23	17	-	8.4	3.75	44.6
31	3	53	-	-	8	11	-	81	33	28	20	251.1	9	4
32	-	10	-	-	-	-	-	10	-	6	4	None Listed	1.66	-
33	-	4	-	-	-	211	-	215	13	6	196	720.3	172	23.8
34	36	52	-	-	-	-	-	88	33	45	4	315.1	17.6	8
27	-	26	-	-	-	94	-	120	10	16	94	507.8	120	23.6
28	3	17	-	-	1	-	-	21	6	6	9	101.	5.9	5.8
Total	1014	385	12	1	131	319	1	1863	837	586	440	37.5	4.5	13

Table No. 14

Summary of Re-eradication Prospect Area Oregon, 1927 by Block Types
With Comparisons with 1925 Results.

Type	Acres			Ribes			Total Ribes			Number Ribes by Species in 1927				Number of Grossularia			Man Days 1927
	No. Worked 1927	No. Worked 1925	% 1925 Worked 1927	No. per Acre 1927	No. per Acre 1925	% 1925 Erad. 1927.	1927	1925	% 1925 Erad. 1927	R. lac.	R. sen.	R. vis.	R. cer.	G. kle.	G. lob.	G. bin.	
Creek	296	82	28	10.2	174	6	837	51,553	1.5	304	202	1		316	14		72
Brushy Burn	34	30	89	9.6	34½	28	288	1,173	2.5	29	163			3	92	1	11
Open Mature Timber	811	149	18.3	1.2	2¾	43	177	2,231	8	7	157	4			9		28
Transitional	286	82	29	4.3	42	10	353	12,015	2.9	3	350				1		29
Brushy Mature Timber	93	30	32	5.3	15¼	35	161	1,418	11	27	125		1		8		26
Reproduction Brush Patchy	67	30	30	1	4	25	19	273	7	1	6	7			5		7
Bottom Land Mature	287	13	4.5	2.1	5¾	36	28	1,683	1.6	15	11				2		10.5
Total	1,974	406	21.6	4.5	37½	13	1,863	70,346	2.6	365	1014	12	1	319	131	1	193

Average acres per man-day--1927 - 2.2

Average acres per man-day--1925 - 2.1

Summary of Per-Capita Expenditures for Public Schools, by States: 1957

[Fifth Conference on Educational Statistics, Washington, D.C., January 1958]

| State | Current expenditures | | |

B. Ecology

Plot No. 1, Prospect Area 1927

This plot about 8X8 feet, is within the G. klamathensis eradication area, 2-3 chains north of Woodruff Meadows Ranger Station. During the summer of 1925, .1 acre of G. klamathensis was eradicated. This plot was examined in September 1926 and seedlings and sprouts removed, and it was again examined in August, 1927. A great many seedlings were found. The entire .1 acre was re-eradicated, except for two small plots, (Plot 1 and 2). Plot 1 is on the north side of a large bunch of bushes, in a fairly open place.

Procedure: The plot was staked off, and a wire fence built around it to protect it from the cattle that ranged through the woods. The seedlings were left, and a chance will be given to follow their history through several years. About 30 of these seedlings, all that could be located, were staked with small wire stakes.

Object: To follow the growth history of Grossularia klamathensis from the seedling stage.

Future data: Make records on plot, showing (1) number of seedlings left, (2) growth conditions, (3) shade, (4) number dying, (5) live stem, new growth, etc., on staked plants.

Record should be kept of the rate of growth of these seedlings, the live stem, and the number of leaves produced the second season and the third season. Record should be made of the mortality and of the number of new seedlings each year.

Note: I think it is probable that some of these seedlings are of 1926 origin, though some are certainly 1927.

Ecology Plot No. 2, Prospect Area 1927

Plot No. 2 about 10X10 feet, is located about 1 rod N.E. of Plot No. 1, on the same eradication area.

This plot was laid out in a much more shady location, with fallen willows and numerous other shrubs growing over it, so that the seedling G. klamathensis plants were quite well shaded and protected.

Object: Same as Plot No. 1, except that this plot represents heavy shade conditions.

1. Ecology

Plot No. 1, Fenwood Area 1927

This plot about 8X8 feet, is within the P. Ponderosa eradication area, 2-3 chains north of Woodruff Meadows Ranger Station. During the summer of 1925, .1 acre of P. Ponderosa was eradicated. This plot was examined in September 1926 and seedlings and sprouts removed, and it was again examined in August, 1927. A great many seedlings were found. The entire .1 acre was re-eradicated, except for two small plots, (plot 1 and 2). Plot 1 is on the north side of a large bunch of bushes, in a fairly open place.

Procedure: The plot was staked off, and a wire fence built around it to protect it from the cattle that ranged through the woods. The seedlings were left, and a chance will be given to follow their history through several years. About 80 of these seedlings, all that could be located, were staked with small wire stakes.

Object: To follow the growth history of Pinus Ponderosa Ponderosa from the seedling stage.

Future data: Make records on plot, showing (1) number of seedlings left, (2) growth conditions, (3) shade, (4) number dying, (5) live stem, new growth, etc., on staked plants.

Record should be kept of the rate of growth of these seedlings, the live stem, and the number of leaves produced the second season and the third season. Record should be made of the mortality and of the number of new seedlings each year.

Note: I think it is probable that some of these seedlings are of 1926 origin, though some are certainly 1927.

Ecology Plot No. 2, Fenwood Area 1927

Plot No. 2 about 10X10 feet, is located about 1 rod N.E. of plot No. 1, on the same eradication area.

This plot was laid out in a much more shady location, with fallen pillows and numerous other shrubs growing over it, so that the seedling P. Ponderosa plants were quite well shaded and protected.

Object: Same as plot No. 1, except that this plot represents heavy shade conditions.

Future data: Make records on growth of G. klamathensis seedlings in plot. Results and data should be compared with Plot No. 1.

Note: More accurate data is needed on this plot. The seedlings should be staked and recorded on a map or chart, and more accurate data taken on light.

Ecology Plot No. 3, Prospect Area 1937.

This plot, 1.57X.4 chains, was located on a rather recent burn, just below a large cliff of rock, where the burn had only killed a part of the trees, thus leaving burned duff on the rather open slope.

Procedure: The plot was staked off, and the Ribes plants all carefully pulled. These plants were counted, the species "guessed at", and the age estimated. Most were three years of age; the age of the others (1 - 2 years) was hard to determine, and it is possible that many classified as 1 or 2 years old were older, but slow growing.

The species was thought to be Grossularia cruenta, but it is possible that some were Grossularia lobbii, as the seedlings of the two species are very similar. 11 one year old plants; 61 two year old, and 106 three year old plants were pulled. A number of Grossularia cruenta fruits were planted in two locations in the plot.

Object: (1) To study the life history of Grossularia cruenta, following a burn.

Future Work on this area: (1) Find out the exact date of this burn. (Could not find this data in office at Medford.)

(2) Make a careful study of the whole burn for seedling G. cruenta plants, recording their age, type of location, and vigor of growth.

(3) Observe plot for new seedlings, following the eradication noted above.

(4) Look for germination of Grossularia cruenta seeds planted in plot.

Conclusion from Data Collected: This burn unquestionably occurred in 1924, or some seedlings would have been found which were more than three years old. From a study of the ground adjacent to this plot, it seems evident that most of the seedling Ribes were Grossularia lobbii. Both G. lobbii and G. cruenta appear to be aided in germination by a light fire. In this locality no evidence could be obtained of the dormancy of seeds in the duff as the numerous old bushes of both G. cruenta and G. lobbii occur on the adjacent combined areas.

Future data: Make records on growth of Q. klamathensis seedlings in plot. Results and data should be compared with Plot No. 1.

Note: More accurate data is needed on this plot. The seedlings should be staked and recorded on a map or chart, and more accurate data taken on light.

Ecology Plot No. 2, Prune ct Area 1927.

This plot, 1.8X.4 chains, was located on a rather recent burn, just below a large cliff of rock, where the burn had only killed a part of the trees, thus leaving burned duff on the rather open slope.

Procedure: The plot was staked off, and the Ribes plants all carefully pulled. These plants were counted, the species "guessed at", and the age estimated. Most were three years of age; the age of the others (1 - 2 years) was hard to determine, and it is possible that many classified as 1 or 2 years old were older, but slow growing.

The species was thought to be Grossularia cruenta, but it is possible that some were Grossularia lobbii, as the seedlings of the two species are very similar. If one year old plants; 81 two year old, and 103 three year old plants were pulled. A number of Grossularia cruenta fruits were planted in two locations in the plot.

Object: (1) To study the life history of Grossularia cruenta, following a burn.

Future Work on this Area: (1) Find out the exact date of this burn. (Could not find this date in office at Medford.)

(2) Make a careful study of the whole burn for seedling G. cruenta plants, recording their age, type of location, and vigor of growth.

(3) Observe plot for new seedlings, following the eradication noted above.

(4) Look for germination of Grossularia cruenta seeds planted in plot.

Conclusion from Data Collected: This burn unquestionably occurred in 1924, or some seedlings would have been found which were more than three years old. From a study of the ground adjacent to this plot, it seems evident that most of the seedling Ribes were Grossularia lobbii. Both G. lobbii and G. cruenta appear to be aided in germination by a light fire. In this locality no evidence could be obtained of the dormancy of seeds in the duff as the numerous old bushes of both G. cruenta and G. lobbii occur on the adjacent combined areas.

Ecology Plot No. 4, Prospect Area 1927

This plot, 40 links square, is situated near the top of a rather high divide between headwaters of Jim Creek and headwaters of the east fork of Elk Creek. Here one enters a region which seems to be the typical habitat of Grossularia binominata. The plot is located near the trail for convenience, in a rather open stand of timber, shade being about 50%. Besides the Ribes and Grossularia on this plot, the following were found, either on or beside the plot: Rubus sp., Corylus california, Rosa sp., Vancouveria hexandra, Berberis nervosa, Vaccinium sp., Phlox sp., Actea sp., and Achlys triphylla.

Ecology Plot No. 4, Prospect Area 1927.

Procedure: The Ribes bushes on the plot were carefully eradicated, and a handful of G. binominata fruits were planted just inside the lower (S.E.) border of the plot, midway between the two lower corners.

Object: (1) To follow as accurately as possible the subsequent regrowth of G. binominata after eradication (by hand pulling) in an area of this kind (high ridge with fairly open, mature timber.)

(2) To check probability of plants growing from buried fruits.

(3) To see if disturbing surface soil (as in eradication) causes dormant seed in soil to germinate.

Data: 700 feet of live stem of G. binominata were removed. This was so interwoven and tangled that it was impossible to determine the number of bushes. Two bushes of G. lobbii and two of R. viscosissimum were also removed.

Future Observations: (1) Check plot carefully for regrowth of any parts left in soil during eradication, for seedlings, and for growth from fruits planted in lower border of plot.

(2) Use this location as a starting point for further studies in the habits and life history of Grossularia binominata: shade conditions for maximum growth-rapidity of growth-methods of reproduction (seed, layering, etc.)

Conclusions from Data on Hand: G. binominata trails on the ground and roots at so many points that it is difficult to determine the number of bushes.

If this place constituted a typical G. binominata site, the feet of live stem per acre of this species is large. This particular spot ran 43, 750 feet of live stem per acre. This, however, was a spot chosen for a study of this species and is not typical of extensive areas.

Ecology Plot No. 4, Prospect Area 1917

This plot, 40 links square, is situated near the top of a rather high divide between headwaters of Jim Creek and headwaters of the east fork of Elk Creek. Here one enters a region which seems to be the typical habitat of Tsuga heterophylla dominants. The plot is located near the trail for convenience, in a rather open stand of timber, shade, being about 30%. Besides the Picea and Tsuga heterophylla on this plot, the following were found, either on or beside the plot: Rubus sp., Corylus californica, Acer sp., Vaccinium parvifolium, Berberis nervosa, Vaccinium sp., Pinus sp., Aster sp., and Xerophyllum tenax.

Ecology Plot No. 4, Prospect Area 1917.

Procedure: The ribbon snakes on the plot were centrally located, and a handful of D. hiemalis fruits were planted just inside the lower (S.E.) border of the plot, midway between the two corners.

Object: (1) To follow as accurately as possible the subsequent regrowth of D. hiemalis after eradication (by hand pulling) in an area of this kind (high ridge with fairly open, mature timber.)

(2) To check probability of plants growing from buried fruits.

(3) To see if disturbed surface soil (as in eradication) causes dormant seed in soil to germinate.

Data: 700 feet of live stem of D. hiemalis were removed. This was so intermoven and tangled that it was impossible to determine the number of bushes. Two bushes of O. lobbii and two of R. viscosissimum were also removed.

Future Observations: (1) Check plot carefully for regrowth of any parts left in soil during eradication, for seedlings, and for growth from fruits planted in lower border of plot.

(2) Use this location as a starting point for further studies in the habits and life history of Grossularia hiemalis; shade conditions for maximum growth-rapidity of growth-methods of reproduction (seed, layering, etc.)

Specimens from Data on Hand: D. hiemalis fruits on the ground and roots at so many points that it is difficult to determine the number of bushes.

If this place constituted a typical D. hiemalis site, one foot of live stem per acre of this species is large. This particular spot chosen for a study of this species and is not typical of extensive areas.

Ecology Plot No. 5, Prospect Area, 1927

This plot, .4X.4 chains, is located near the stream bank (Abbott Creek) where the level, sandy soil has been recently deposited. The forest here is quite open and the trees large, with a much lower understory of shrubs, especially vine maple. The shade is about 70%. The vine maple constitutes about 50% ground cover. There are scattering, trailing Rubus, rose bushes and thimble berry.

Procedure: The plot was staked out, and a map made showing the location of Ribes trees and oth r significant plants. Data was then taken on the individual bushes of Ribes sanguineum and the individual trees.

Object: (1) To secure growth data on Ribes sanguineum in an open mature forest with considerable understory of the vine maple type of shrub.

Future Data: Take data on individual plants, as in data sheet. Get accurate data on light conditions.

Ecology Plot No. 5a, Prospect Area, 1927

This plot consisted of 6 bushes of Grossularia lobbii that were adjacent to Plot No. 5. Each bush was staked and numbered, and then different procedure followed with each bush.

Procedure: No. 1. The bush with 6 feet of live stem and 5 feet of dead stem was pulled and duff and soil were very little disturbed.

No. 2. The plant with 22 feet of live stem and 12 feet of dead stem was cut off just below crown and the soil dug up about it.

No. 3. The bush with 60 feet of live stem, 22 feet of dead stem and abundant mature fruits, was pulled and the fruits shaken off on the ground. The ground was then dug up very thoroughly to bury fruits.

No. 4. The bush with 12 feet live stem and 9 feet of dead stem and abundant mature fruits was pulled and the soil was very little disturbed. The fruits were shaken off on the soil, but not buried.

No. 5. The plant with 21 feet of live stem and 5 feet of dead stem was left, to observe its growth, dying, new shoots and anything else which may reveal itself. This bush, in 50% shade, had 3½ feet of new growth.

Ecology Plot No. 3, Present Use, 1942

This plot, .4A.4 chains, is located near the stream bank (Abbott Creek) where the level, sandy soil has been recently deposited. The forest here is quite open and the trees large, with a much lower understory of shrubs, especially vine maple. The shade is about 70%. The vine maple constitutes about 30% ground cover. There are scattering, trailing Rubus, rose bushes and thimble berry.

Procedure: The plot was staked out, and a map made showing the location of Rubus bushes and other significant plants. Data was taken on the individual trees of Pinus ponderosa and the individual trees.

Object: (1) To secure growth data on Pinus ponderosa in an open nature forest with comparable understory of the vine maple type of shrub.

Future Data: Take data on individual plants, as in data sheet. Get accurate days on light conditions.

Ecology Plot No. 4, Present Use, 1942

This plot consisted of 6 bushes of Rhamnus californica that were adjacent to Plot No. 5. Each bush was staked and numbered, and then different procedure followed with each bush.

Procedure: No. 1. The bush with 6 feet of live stem and 5 feet of dead stem was pulled and duff and soil were very little disturbed.

No. 2. The plant with 23 feet of live stem and 12 feet of dead stem was cut off just below crown and the soil dug up about it.

No. 3. The bush with 60 feet of live stem, 25 feet of dead stem and abundant mature fruits, was pulled and the fruits shaken off on the ground. The ground was then dug up very thoroughly to bury fruits.

No. 4. The bush with 12 feet live stem and 3 feet of dead stem and abundant mature fruits was pulled and the soil was very little disturbed. The fruits were shaken off on the soil, but not buried.

No. 5. The plant with 11 feet of live stem and 3 feet of dead stem was left, to observe its growth, dying, new sprouts and anything else which may revert itself. This bush, in 80% shade, had 25 feet of new growth.

No. 6. Some grass about bush. There was no duff. The bush was left and the soil dug up very thoroughly below it. Some grass at the base was thus dug up and a bed made for the fruits to fall in.

Object: The treatment of these six bushes gives an opportunity for comparing different conditions in nature produced naturally or artificially. The data taken in the future will be compared with the data here recorded. The experiment should throw some light on the effect of artificial accidental cultivation, on the effect of abundance of fruits, partial shade, actual burial of the fruits, etc. Data can also be taken on new growth production, seed production and dying out.

Conclusions from Data Taken: It is evident that G. lobbii will produce abundant fruit in partial shade. It also appears that the wood of this species has a tendency to die back at an early age. This point should be studied out carefully.

Ecology Plot No. 6, Prospect Area, 1927.

This plot, .4X.6 chains, is located in the edge of a mature forest, on level, sandy, alluvial land near Abbott Creek. The trees are very scattered, affording a light shade, but young trees are coming in which will change shade conditions within a few years. It is a typical Grossularia lobbii site and offers excellent opportunity for a study of this species.

Procedure: The plot was laid off and carefully mapped. Individual data was then taken on the Grossularia lobbii (one G. klamathensis) in the plot.

Object: To secure data on growth of Grossularia lobbii.

Future Observations: (1) Take data again on individual plants.

(2) Secure some accurate data on shade conditions. The plot has numerous young conifers coming in, which should make decided differences in shade conditions in succeeding years.

Ecology Plot No. 6a, Prospect Area 1927.

This plot is adjacent to plot No. 6. It consisted of 4 plants (Nos. 7-8-9-10) that were accorded various treatments, as outlined.

Procedure: Each plant was staked, numbered, and treated as outlined below:

No. 7. Grossularia lobbii. This bush, in about 55% shade, had 14 feet of live stem and about 30 feet of dead stem. It was fruiting. The bush was cut off at surface of ground below the crown, and the ground was dug up about it.

No. 6. Some grass about bush. There was no duff. The bush was left and the soil dug up very thoroughly below it. Some grass at the base was thus dug up and a bed made for the fruits to fall in.

Object: The treatment of these six bushes gives opportunity for comparing different conditions in nature produced naturally or artificially. The data taken in the future will be compared with the data here recorded. The experiment should throw some light on the effect of artificial mechanical cultivation, on the effect of abundance of fruits, partial shade, actual burial of the fruits, etc. Data can also be taken on new growth production, seed production and dying out.

Conclusions from Data Taken: It is evident that G. Jobbii will produce abundant fruit in partial shade. It also appears that the wood of this species has a tendency to die back at an early age. This point should be studied out carefully.

Ecology Plot No. 5, Present Area, 1917.

This plot, 4x4 chains, is located in the edge of a mature forest, on level, sandy, alluvial land near Abbott Creek. The trees are very scattered, affording a light shade, but young trees are coming in which will change shade conditions within a few years. It is a typical Grossularia Jobbii site and offers excellent opportunity for a study of this species.

Procedure: The plot was laid off and carefully mapped. Individual data was then taken on the Grossularia Jobbii (see G. Miscellanea in the plot.

Object: To secure data on growth of Grossularia Jobbii.

Future Observations: (1) Take data again on individual plants.

(2) Secure some accurate data on shade conditions. The plot has numerous young conifers coming in, which should make decided differences in shade conditions in succeeding years.

Ecology Plot No. 6a, Present Area 1917.

This plot is adjacent to plot No. 6. It consisted of 4 plants (Nos. 7-8-9-10) that were covered various treatments, as outlined.

Procedure: Each plant was staked, numbered, and treated as outlined below:

No. 7. Grossularia Jobbii. This bush, in about 85% shade, had 14 feet of five stem and about 30 feet of dead stem. It was fruiting. The bush was cut off at surface of ground below the crown, and the ground was dug up about it.

No. 8. Some grass about bush. There was no duff. The bush was left and the soil dug up very thoroughly below it. Some grass at the base was thus dug up and a bed made for the fruits to fall in.

Object: The treatment of these six bushes gives opportunity for comparing different conditions in nature produced naturally or artificially. The data taken in the future will be compared with the data here recorded. The experiment should throw some light on the effect of artificial mechanical cultivation, on the effect of abundance of fruits, partial shade, actual burial of the fruits, etc. Data can also be taken on new growth production, seed production and dying out.

Conclusions from Data Taken: It is evident that G. Jobbii will produce abundant fruit in partial shade. It also appears that the wood of this species has a tendency to die back at an early age. This point should be studied out carefully.

Ecology Plot No. 5, Present Area, 1917.

This plot, 4x4 chains, is located in the edge of a mature forest, on level, sandy, alluvial land near Abbott Creek. The trees are very scattered, affording a light shade, but young trees are coming in which will change shade conditions within a few years. It is a typical Grossularia Jobbii site and offers excellent opportunity for a study of this species.

Procedure: The plot was laid off and carefully mapped. Individual data was then taken on the Grossularia Jobbii (see G. Miscellanea in the plot.

Object: To secure data on growth of Grossularia Jobbii.

Future Observations: (1) Take data again on individual plants.

(2) Secure some accurate data on shade conditions. The plot has numerous young conifers coming in, which should make decided differences in shade conditions in succeeding years.

Ecology Plot No. 6a, Present Area 1917.

This plot is adjacent to plot No. 6. It consisted of 4 plants (Nos. 7-8-9-10) that were covered various treatments, as outlined.

Procedure: Each plant was staked, numbered, and treated as outlined below:

No. 7. Grossularia Jobbii. This bush, in about 85% shade, had 14 feet of five stem and about 30 feet of dead stem. It was fruiting. The bush was cut off at surface of ground below the crown, and the ground was dug up about it.

No. 8 Grossularia lobbii. This bush had 5 feet of live stem and 15 feet of dead stem, and the bush, though well fruited, seemed to be dying. Considerable grass was about the plant. The successive 1925, 1926 and 1927 growth of live stem showed that growth was rapid in 1925 and 1926, and very little in 1927. Several other sprouts from old root were dead. The bush seems to die off after reaching a certain age (3years), and sends up new shoot from old crown. This bush was not disturbed.

No. 9. Ribes sanguineum. This bush had 60 feet of live stem and a few fruits. It was eradicated by grubbing and hand pulling but three stubs of roots were left in the soil.

No. 10. Grossularia lobbii. This bush had 15 feet of live stem and 20 feet of dead stem and very little new growth. It was well fruited. It was pulled carefully, and the soil was disturbed as little as possible. The fruits were left on the surface of the ground on the light duff.

Future Observations: Check the site of each of these four plants very carefully, and record data.

No. 7 should be studied for possible root sprouts and for seedling in the soil that was disturbed.

No. 8 should likewise be studied for seedling on the undisturbed soil. The age of the crown shoots should be noted and the new growth on the old stems measured. The age of shoots when fruiting begins and ends should also be noted.

No. 9 should be studied for root sprouts and for seedling in the disturbed and undisturbed soil about the site of the old bush.

No. 10 site should be watched for sprouts and seedlings and compared especially with No. 7.

Ecology Plot No. 7, Prospect Area, 1927.

This plot, 6X12 feet, is situated in the deep woods of the typical dense mature forest with about 95% shade. Considerable reproduction is coming in. This area has not burned over, at least not in very recent times.

Procedure: The plot was staked off into eight 3 feet squares, and the duff was carefully removed down to mineral soil. The squares were numbered, and fruits of six different important species of the Ribes of this region were planted in squares (50 fruits in each square) one inch deep.

No. 8. Cressmaria lobbii. This bush had 3 feet of live stem and 18 feet of dead stem, and the bush, though well fruited, seemed to be dying. Considerable grass was about the plant. The succeeding 1938, 1936 and 1937 growth of live stem showed that growth was rapid in 1936 and 1936, and very little in 1937. Several other sprouts from old root were dead. The bush seemed to die off after reaching a certain age (3years). And sends up new shoots from old crown. This bush was not disturbed.

No. 9. Ribes menziesii. This bush had 60 feet of live stem and a few fruits. It was practically by grubbing and hand pulling but three stubs of roots were left in the soil.

No. 10. Cressmaria lobbii. This bush had 15 feet of live stem and 30 feet of dead stem and very little new growth. It was well fruited. It was pulled carefully, and the soil was disturbed as little as possible. The fruits were left on the surface of the ground on the light duff.

Future Observations: Check the site of each of these four plants very carefully, and record date.

No. 7 should be studied for possible root sprouts and for seedling in the soil that was disturbed.

No. 8 should likewise be studied for seedling on the undisturbed soil. The age of the crown should be noted and the new growth on the old stems measured. The age of shoots when fruiting begins and ends should also be noted.

No. 9 should be studied for root sprouts and for seedling in the disturbed and undisturbed soil about the site of the old bush.

No. 10 site should be watched for sprouts and seedlings and compared especially with No. 7.

Ecology plot No. 7, Pressent area, 1937.

This plot, 6X12 feet, is situated in the deep woods of the typical dense mature forest with about 95% shade. Considerable reproduction is coming in. This area has not burned over, at least not in very recent times.

Procedure: The plot was staked off into eight 3 feet squares, and the duff was carefully removed down to mineral soil. The squares were numbered, and fruits of six different important species of the Ribes of this region were planted in squares (60 fruits in each square) one inch deep.

Object: To determine the effect of shade on the germination of Ribes seeds. This plot and Plot No. 8 are to be checked against each other.

Future Observations: Check each square very carefully for germination of seeds planted. Secure accurate records of light conditions.

Note: This plot brings in the unnatural factor of duff removal in the dense shade. This would have been much better if check plots with similar shade conditions had been planted where the duff was undisturbed. The experiment seems to be based on the assumption that Ribes seeds will not germinate in duff. This has not been shown to be true here. The experiment, however, should give some valuable results on germination in the shade.

Ecology Plot No. 8, Prospect Area, 1927

Plot No. 8, 6x9 feet, is located on a burn, where the exposure to sunlight is great as possible, as a contrast to Plot No. 7. The burn was a heavy one, leaving the ground bare and devoid of all duff, and no trees standing to produce shade. The area is largely grown up to Ceanothus, and the shade is about 10%.

Procedure: The plot was marked off into squares, and the squares were planted to different fruits, as in Plot No. 7. 50 fruits were used on each square.

Object: To determine effect of light on germination of various species of Ribes seeds, remembering that this plot is free from duff.

Ecology Plot No. 9, Prospect Area, 1927

This plot is located on a southeast-facing slope, near a small stream, Brown's Creek flowing into the Rogue River. The land appears to have been burned over repeatedly many years ago but at present is covered with brush, chiefly Ribes cereum, Amelanchier sp., Ceanothus velutina, and Salix sp., and with Pinus contorta, Pseudotsuga taxifolia, and Pinus monticola with frequent white fir, yellow pine and sugar pine. In many places there is considerable undergroth of Grossularia binominata.

Purpose of the Studies: As there is an abundance of Ribes cereum in many parts of the Crater National Forest in association with both sugar pine and western white pine, a thorough study of its growth

Object: To determine the effect of shade on the germination of Ribes seeds. This plot and plot No. 8 are to be checked against each other.

Future Observations: Check each square very carefully for germination of seeds planted. Secure accurate records of light conditions.

Note: This plot brings in the unnatural factor of duff removal in the dense shade. This would have been much better if check plots with similar shade conditions had been planted where the duff was undisturbed. The experiment seems to be based on the assumption that Ribes seeds will not germine in the duff. This has not been shown to be true here. The experiment, however, should give some valuable results on germination in the shade.

Ecology Plot No. 8, Prospect Area, 1927

Plot No. 8, 6X3 feet, is located on a burn, where the exposure to sunlight is great as possible, as a contrast to plot No. 7. The burn was a heavy one, leaving the ground bare and devoid of all duff, and no trees standing to produce shade. The area is largely grown up to Ceanothus, and the shade is about 10%.

Procedure: The plot was marked off into squares, and the squares were planted to different fruits, as in plot No. 7. 50 fruits were used on each square.

Object: To determine effect of light on germination of various species of Ribes seeds, remembering that this plot is free from duff.

Ecology Plot No. 9, Prospect Area, 1927

This plot is located on a southwest-facing slope, near a small stream, known as Creek Flowing into the Rogue River. The land appears to have been burned over repeatedly many years ago but at present is covered with brush, chiefly Ribes cereum, Amelanchier sp., Ceanothus velutina, and Salix sp., and with Pinus ponderosa, Pseudotsuga taxifolia, and Pinus monticola with frequent white fir, yellow pine and sugar pine. In many places there is considerable undergrowth of Gaultheria shallon.

Purpose of the Station: As there is an abundance of Ribes cereum in many parts of the Crater National Forest in association with sugar pine and western white pine, a thorough study of its growth

and reproduction should be made. The idea of these plots is to determine the effect of heavy and light burning and duff removal on the germination of R. cereum seed, the vast abundance of fruit borne by the R. cereum bushes here assuring its presence.

Procedure: The site chosen was one with an abundance of R. cereum, but one not materially different from many parts of the region. Since we wished to study the effect of burning on the germination of R. cereum seed and also of exposure of mineral soil, we picked a site where there was very little mineral soil exposed naturally. Four milacre plots were set off. In the first milacre a very large R. cereum bush, so large that the ends of the branches extended beyond the edges of the plot, was chosen. On this we piled dead brush and burned it severely. On the second milacre lying adjoining the first we spread a slight covering of twigs and burned it slightly. On the third milacre adjoining No. 2, we scraped off the duff and removed all plants, exposing mineral soil throughout. Milacre No. 4 was so placed that it took in a R. cereum bush and a piece of ground practically bare of vegetation. This was set off as a check plot. Milacre No. 1 contained besides a large R. cereum bush, Symphoricarpos sp., Rubus sp., Ceanothus prostratus, Rosa Sp., Ceanothus velutinus. The R. cereum bush was 5 feet high and had about 1800 feet of live stem.

Milacre No. 2 contained one small bush of Ceanothus velutimus, a small bush of Amelanchier sp., many dead Ceanothus branches and R. cereum branches extending over from other plots.

Milacre No. 3 contained Symphorocarpus sp., Solidago sp., and Rubus sp.

Milacre No. 4 contained a large R. cereum bush spreading over practically the entire milacre, some Rubus sp., Solidago, grass, Ceanothus prostratus and some dead Ceanothus velutinus branches.

Milacre No. 5 is almost bare save for some Solidago on the north side. The bare portion is strewn with disintegrating pumice and lava.

Data to be Taken in the Future: These plots should be studied for germination of R. cereum particularly, and the data in the different milacres compared.

Ecology Plot No. 10, Prospect Area, 1927

This plot is located on Brown's Creek near Brown's Cabin Ranger Station and is made up of several parts. A strip was first laid off 2 chains long and .1 chain wide. This is part No. a. The other portions were each 1 milacre. Milacres b and c are below the trail and milacres d and e are a part of the strip "a", and are above the trail.

and reproduction should be made. The idea of these plots is to determine the effect of heavy and light burning and duff removal on the germination of P. ceresum seed, the vast abundance of fruit borne by the P. ceresum bushes here meaning its presence.

Procedure: The site chosen was one with an abundance of P. ceresum, but one not materially different from many parts of the region. Since we wished to study the effect of burning on the germination of P. ceresum seed and also of exposure of mineral soil, we picked a site where there was very little mineral soil exposed naturally. Four milacre plots were set off. In the first milacre a very large P. ceresum bush, so large that the ends of the branches extended beyond the edges of the plot, was chosen. On this we piled dead brush and burned it severely. On the second milacre lying adjoining the first we spread a slight covering of twigs and burned it slightly. On the third milacre adjoining No. 2, we scraped off the duff and removed all plants, exposing mineral soil thoroughly. Milacre No. 4 was so placed that it took in a P. ceresum bush and a piece of ground practically bare of vegetation. This was set off as a check plot. Milacre No. 1 contained a small bush of Amelanchier sp., many dead Ceanothus branches and P. ceresum branches extending over from other plots.

Milacre No. 2 contained one small bush of Ceanothus velutinus, Rubus sp., Symphoricarpos sp., Solidago sp., and Festuca sp.

Milacre No. 3 contained a large P. ceresum bush spreading over practically the entire milacre, some Rubus sp., Solidago sp., Ceanothus prostratus and some dead Ceanothus velutinus branches.

Milacre No. 4 contained a large P. ceresum bush spreading over the P. ceresum branches here meaning its presence.

Data to be Taken in the Future: These plots should be studied for germination of P. ceresum particularly, and the data on the different milacres compared.

Locality Plot No. 10, Prospect Creek, Ore.

This plot is located on Brown's Creek near Brown's Cabin Camper Station and is made up of several parts. A strip was first laid off 3 rodins long and 1 chain wide. This is part No. 2. The other portion was 4 rods by 1 milacre. Milacres b and c are below the trail and milacres d and e are a part of the strip "a", and are above the trail.

Milacre c. Description of Site: See general description of the region given under Ecology Plot No. 1, Preserve area. In most of the remains and on [illegible] are in the brush type with perhaps 500 stems.

This milacre was brushy with Ceanothus and Amelanchier, and G. binominata was abundant. The brush was cut and most of it thrown off the plot. Then enough twigs and leaves were thrown to produce a light fire which would only scorch the duff.

Purpose: To study the germination of G. binominata on well seeded ground lightly burned.

Milacre d. [illegible] were established for the study of the growth, germination and reproduction of G. binominata. As well as a different treatment, each will be discussed separately.

This milacre was staked out on part a. The G. binominata were removed but nothing further done. This is to be used as a check plot against milacres b, c and e.

Milacre e.

This plot was also laid out on part a. The G. binominata were eradicated and the duff was carefully removed. Brush other than G. binominata was not removed.

Data to be taken in the future: These plots should be examined for seedlings and sprouts, data taken on rate of growth and the results compared for the different milacres.

Results on this series of milacres should be compared with the results from the plots for this same species in the open.

[illegible] There were 882 stems. [illegible] There were 82 stems [illegible] cases of layering. [illegible] many [illegible] were [illegible] bore no fruits.

Conclusion: G. binominata [illegible] rather [illegible] ly. If the above area is [illegible] typical, an acre of [illegible] land would have 4,906 stumps and 36,300 feet of live stem.

Milacre f.

There was a large amount [illegible] in the vicinity of this area with an abundance of G. binominata [illegible]. The [illegible] cut and brush was piled on the ground and burned.

Purpose: To study the germination of G. binominata following heavy burn on a site where there [illegible] of this species.

Description of Site: See general description of the region given under Ecology Plot No. 9, Prospect Area. In many of the swales and on some of the slopes of this region, Grossularia binominata is abundant. It grows in the open as well as under the edges of clumps of taller bushes. The vegetation on this site consisted of Amelanchier, Salix, Rubus, Ceanothus and Grossularia. The milacres considered here are in the brush type with perhaps 50% shade.

Purpose: These milacres were established for the study of the growth, germination and reproduction of G. binominata. As each portion had a different treatment, each will be discussed separately.

Part No. a.

Description: This part consisting of 20 milacres ran parallel to the trail and took in some brush and more open type.

Purpose: The object here was to get a concrete idea of the number of bushes and amount of live and dead stem, habit and growth of G. binominata, and to supply an eradicated strip for the study of germination and sprouting.

Procedure: The crew carefully pulled all of the G. binominata on the strip, counted the bushes, estimated the live stem, and noted amount of layering.

Data: 98 bushes were removed from the 20 milacres. These ranged from 6 inches to 2 feet in height, but very rarely over 1 foot. They gave 825 feet of live stem. On the area there were 82 distinct cases of layering. One clump of bushes was heavily fruited but many bore no fruits.

Conclusion: G. binominata is a low trailer, which layers freely. If the above area is assumed to be typical, an acre of G. binominata land would have 4,900 bushes and 41,250 feet of live stem.

Milacre b.

There was a large Amelanchier bush in the center of this area with an abundance of G. binominata at its base. The tall brush was cut and dead brush was piled on the ground and burned.

Purpose: To study the germination of G. binominata after a heavy burn on a site where there must have been deposited abundant seeds of this species.

of this species.

heavy burn on a site where there must have been deposited abundant seeds

Purpose: To study the germination of *D. binominata* after a

cut and dead brush was piled on the ground and burned.

with an abundance of *D. binominata* at its base. The tall brush was

There was a large Amelanchier bush in the center of this area

Milacre 5.

land would have 4,900 bushes and 41,250 feet of live stem.

ly. If the above area is assumed to be typical, an acre of *D. binominata*

Conclusion: *D. binominata* is a low trailer, which layers freely. If the above area is assumed to be typical, an acre of *D. binominata* land would have 4,900 bushes and 41,250 feet of live stem.

Milacre 5.

There was a large Amelanchier bush in the center of this area with an abundance of *D. binominata* at its base. The tall brush was cut and dead brush was piled on the ground and burned.

Purpose: To study the germination of *D. binominata* after a heavy burn on a site where there must have been deposited abundant seeds of this species.

Ecology Plot No. 11, Prospect Area, 1927

This plot is located near Brown's Cabin Ranger Station. See description of this region under Ecology Plot No. 9. This particular plot is in an opening in the timber where there is very little brush, and where there is 100% sunshine. Grossularia binominata occurred on all four of the milacres, growing in the open.

Object: Here we wish to get data on the germination and sprouting from roots of G. binominata after eradication, also the effect of light and heavy burning on buried or partially buried seed.

A plot 20 links square was staked and divided into 4 milacre plots.

Plot A. 15 G. binominata (the only Ribes present) with 85 feet of live stem were eradicated and all duff removed.

Plot B. Contained 9 *G. binominata with 50 feet of live stem which were left. A light sprinkling of twigs and leaves were scattered over the plot and fired, scorching the entire area but not burning it severely.

Plot C. Contained 15 *G. binominata with 90 feet of live stem. This plot was left as a check, the Ribes and other vegetation being left undisturbed.

Plot D. Contained 16 *G. binominata with 100 feet of live stem which were not removed. The plot was subjected to heavy burning.

*Where the bushes were not removed, it was difficult to determine the exact number, as G. binominata trails, intertwines and roots in many places.

Data to be taken in the future: Each of these sections should be checked over carefully for seedlings and sprouts. Sec. B should show whether light burning is sufficient to kill G. binominata. If seedlings appear, studies can be made on rate of growth.

Ecology Plot No. 12, Prospect Area, 1927

This plot of 6 milacres is situated in a mature stand of Douglas and white fir, with an occasional vine maple and a little underbrush. Shade is nearly 100%. The plots are far enough from the creek to represent the usual dry bottom land forest conditions.

Ecology Plot No. 11, Pinchot Area, 1937

This plot is located near Brown's Cabin Ranger Station. See description of this region under Ecology Plot No. 9. This particular plot is in an opening in the timber where there is very little brush, and where there is 100% sunshine. Ponderosa pine seedlings occurred on all four of the subareas, growing in the open.

Object: Here we wish to get data on the germination and growing from roots of 6, dinoseb after germination, also the effect of light and heavy burning on buried or partially buried seed.

Plot No. 1. A plot 30 links square was staked and divided into 4 milacre plots.

Plot 1. 15 #. dinoseb (the only spray present) with 85 feet of live stem were treated and all duff removed.

Plot 2. Contained 9 #. dinoseb with 80 feet of live stem which were left. A light sprinkling of twigs and leaves were scattered over the plot and fired, scorching the entire area but not burning it severely.

Plot 3. Contained 15 #. dinoseb with 90 feet of live stem. This plot was left as a check, the slash and other vegetation being left undisturbed.

Plot 4. Contained 18 #. dinoseb with 100 feet of live stem which were not removed. The plot was subjected to heavy burning.

Where the snakes were not removed, it was difficult to determine the exact number, as dinoseb treats, intertwines and roots in many places.

Data to be taken in the future: Each of these sections should be checked over carefully for seedlings and sprouts. Sec. 4 should show whether light burning is sufficient to kill dinoseb. If seedlings appear, studies can be made on rate of growth.

Ecology Plot No. 12, Pinchot Area, 1937

This plot of 6 milacres is situated in a mature stand of Douglas and white fir, with an occasional vine maple and a little underbrush. Shade is nearly 100%. The plots are far enough from the creek to represent the usual dry bottom land forest conditions.

Purpose: It was thought well to perform an experiment on the effect of root competition on the growth and germination of Ribes. In all but the check plots the tree root competition has been removed. The treatment of the several plots supplies conditions favorable or otherwise for germination. The experiment should show whether Ribes seeds will germinate in the shade, 1st, in duff; 2nd, in mineral soil; 3rd, in a light burn, and 4th, in a heavy burn. It must be remembered that the burning was done after the plots were seeded.

Procedure: The plots were laid out and the main portion was trenched with a trench reaching well below the tree roots. It was dug fully 2½ feet deep. All roots were cut. After being trenched, the dirt was thrown back into the ditch and tramped down. As we had no assurances that Ribes seeds were present, we planted seeds of R. cereum and G. klamathensis. As we were not certain Ribes seeds were not present, we left a portion of the plot unplanted as a check. We also set aside plots to be used as a check which were not trenched.

Section No. 1. (One milacre) was neither trenched, planted, nor otherwise disturbed, except to be staked and wired, (i.e., a boundary wire stretched around it).

Section No. 2. (One milacre) staked, wired and planted with 2 rows of R. cereum; 2 rows of G. lobbii, and 2 rows of G. cruenta. Duff and twigs were left intact.

Section No. 3. (One milacre) staked, wired, trenched and planted. The duff and twigs were left undisturbed.

Section No. 4. (One milacre) staked, wired, trenched, and duff removed, after which it was planted, seeds being placed in mineral soil.

Section No. 5. (One milacre) staked, wired, trenched, planted, and then subjected to light firing.

Section No. 6. (One milacre) staked, wired, trenched, planted, and then subjected to a hard burn.

Work to be done in the Future: Data will be taken on all vegetation coming in on the trenched plots, and this will be compared with that on the untrenched. The series on the burned and unburned will be compared with plots subjected to like treatment, except for trenching, the plots being out in full sunshine.

Purpose: It was thought well to perform an experiment on the effect of root competition on the growth and germination of Mikes. In all but the check plots the tree root competition has been removed. The treatment of the several plots multiplies conditions favorable or otherwise for germination. The experiment should show whether Mikes seeds will germinate in the shade, 1st, in dark; 2nd, in mineral soil; 3rd, in a light burn, and 4th, in a heavy burn. It must be remembered that the burning was done after the plots were seeded.

Procedure: The plots were laid out and the main portion was trenched with a trench reaching well below the tree roots. It was dug fully 3½ feet deep. All roots were cut. After being trenched, the dirt was thrown back into the ditch and tramped down. As we had no assurances that Mikes seeds were present, we planted seeds of P. ponderosa and P. flamentensis. As we were not certain Mikes seeds were not present, we left a portion of the plot unplanted as a check. We also set aside plots to be used as a check which were not trenched.

Section No. 1. (One milacre) was neither trenched, planted, nor otherwise disturbed, except to be staked and wired, (i.e., a boundary wire stretched around it).

Section No. 2. (One milacre) staked, wired and planted with 3 rows of P. ponderosa; 3 rows of P. Jeffrii and 3 rows of P. ornamta. Duff and twigs were left intact.

Section No. 3. (One milacre) staked, wired, trenched and planted. The duff and twigs were left undisturbed.

Section No. 4. (One milacre) staked, wired, trenched, and duff removed, after which it was planted, seeds being placed in mineral soil.

Section No. 5. (One milacre) staked, wired, trenched, planted, and then subjected to light firing.

Section No. 6. (One milacre) staked, wired, trenched, planted, and then subjected to a hard burn.

Work to be done in the Future: Data will be taken on all the plots being cut in full summaries, compared with plots subjected to like treatment, except for trenching, that on the untrenched. The series on the burned and unburned will be compared with vegetation coming in on the trenched plots, and this will be compared with

C. Reconnaissance 1927

1. Two strips, 15 chains long and 5 chains apart were run across a 1924 burn near Golden Stair Trail in order to estimate the number of Ribes by species on the burn. The Ribes were recorded in each chain to show on what part of the burn they occur. 33 G. cruenta were found, with 166 feet of live stem and 14 feet of dead stem, and 46 G. lobbii, with 142 feet of live stem and 50 feet of dead stem. This makes 79 bushes with 308 feet of live stem and 64 feet of dead stem on the 3/4 acre considered. On the basis of species, we have 44 G. cruenta per acre and 61 G. lobbii or 105 bushes of both species. It should be noted that much of this ground is Ribes free.

On this particular site the Ribes are rather abundant on the cliff, or on the talus slope below it. Here the fire varied from light on the slide to no burn on the cliff itself.

2. A reconnaissance strip for the study of Ribes cereum was run parallel to a trail running in a southwesterly direction from the beaver dams on Brown's Creek. This strip was 12 chains long and 10 links wide. It was run through sufficient territory to give an average of conditions on this site. The total shows 90 bushes of R. cereum in the strip, 3,268 feet of live stem and 324 feet of dead stem, or 750 bushes per acre, 27,400 feet of live stem per acre and 2,700 feet of dead stem per acre. The field data tables will show a very little G. binominata on this strip. There are many R. cereum bushes growing in the standing Pinus contorta. These are usually quite stunted and have but little live stem to the bush, whereas those in the open are often enormous bushes with hundreds of feet of live stem to the bush.

D. Scouting 1927

A scouting trip was made to a 1917 burn south of Anderson Camp. From Brown's Cabin above Union Creek Ranger Station the trail starts through a small lodge pole pine flat. In the flat occurs a species of Grossularia which appears to be not fully described in the Ribes key. The vine of the gooseberry resembles very closely G. binominata, but the fruit is more gummy and sticky, and clothed with fewer spines. After passing through this flat, the trail enters good timber of A. grandis, P. monticola, P. lambertiana, and Pseudotsuga taxifolia, for several miles. R. lacustre was noted along streams, but very few Ribes in the thick timber. Farther up the trail toward the ridge, the timber opens up a little, and some Ribes are found. The same species of Grossularia encountered in the flat is found in varying abundance along the trail, gradually giving place, as higher elevation was reached, to G. binominata, the two growing together in many places. R. viscosissimum becomes abundant at the higher elevation, and on the ridge a considerable amount of R. cereum occurs.

C. Reconnaissance 1927

1. Twelvetrips, 15 chains long and 5 chains apart were run across a 1924 burn near Golden Stair Trail in order to estimate the number of Ribes by species on the burn. The Ribes were recorded in each chain to show on what part of the burn they occur. 52 _R. cereum_ were found, with 1265 feet of live stem and 14 feet of dead stem, and 46 _R. lobbii_, with 1142 feet of live stem and 80 feet of dead stem. This makes 79 bushes with 308 feet of live stem and 64 feet of dead stem on the 3/4 acre considered. On the basis of species, we have 44 _R. cereum_ per acre and 61 _R. lobbii_ or 105 bushes of both species. It should be noted that much of this ground is Ribes free.

On this particular site the Ribes are rather abundant on the cliff, or on the talus slope below it. Here the fire varied from light on the slide to no burn on the cliff itself.

2. A reconnaissance strip for the study of Ribes cereum was run parallel to a trail running in a southwesterly direction from the beaver dams on Brown's Creek. This strip was 12 chains long and 10 links wide. It was run through sufficient territory to give an average of conditions on this site. The total shows 90 bushes of _R. cereum_ in the strip, 3,352 feet of live stem and 324 feet of dead stem, or 750 bushes per acre, 27,400 feet of live stem per acre and 2,700 feet of dead stem per acre. The field data tables will show a very little _R. bracteosum_ on this strip. There are many _R. cereum_ bushes growing in the standing _Pinus contorta_. These are usually quite stunted and have but little live stem to the bush, whereas those in the open are often enormous bushes with hundreds of feet of live stem to the bush.

D. Scouting 1927

A scouting trip was made to a 1917 burn south of Anderson Creek. From Brown's Cabin above Union Creek Ranger Station the trail starts through a small lodge pole flat. In the flat occure a species of Grossularia which appears to be not fully described in the Ribes key. The vine of the gooseberry resembles very closely _R. bracteosum_, but the fruit is more mumy and stick, and clothed with fewer spines. After passing through this flat, the trail enters mixed timber of _A. grandis_, _P. menziesii_, _T. lamberti ana_, and _Pseudotsuga taxifolia_, for several miles. _R. lacustre_ was noted along streams, but very few Ribes in the thick timber. Further up the trail toward the ridge, the timber opens up a little, and some Ribes are found. The same species of Grossularia encountered in the flat is found in varying abundance along the trail, usually living places, as higher elevation was reached, to _R. bracteosum_ the two growing together in many places. _R. viscosissimum_ becomes abundant at the higher elevation, and on the ridge a considerable amount of _R. cereum_ occurs.

The burn itself was a rather severe one, and very little timber has started to come in. The whole burn is a veritable pasture of Ribes. They are so numerous that no attempt was made to count them. Near the top of the ridge where the timber was notably thin before the fire, the R. cereum seems to have lived through the fire, as many of the bushes are 13 to 15 years of age. Within the main body of the burn, the tops of all bushes were killed, but the roots were not, and these have sent up new growth, about 8 or 9 years old. Brush is not very thick on the burn, there being some Corylus and Ceanothus. In point of numbers Ribes rank about as follows: G. binominata, R. viscosissimum, G. lobbi, R. lacustre, R. cereum. No R. sanguineum was noted in this burn or along the trail.

Chipmunks were noted to be eating the fruits of G. binominata and the other species of Grossularia resembling G. binominata. No evidence could be found that they bother the G. lobbii fruits.

The Diamond Lake country was scouted pretty thoroughly. From the Crater Lake road Ribes cereum is very abundant nearly all along the road, to Diamond Lake. The first 3 or 4 miles is largely lodgepole pine. Then there is about 10 miles of better timber with some sugar pine and white pine. The last 10 miles of the highway to Diamond Lake is nearly all lodge pole pine. Here there is occasionally some R. sanguineum and G. binominata.

The timber around Diamond Lake is largely lodge pole and yellow pine. Ribes are rather numerous. R. cereum, R. lacustre, G. cruenta and G. binominata are common, and occasionally there is a bush of R. viscosissimum and R. sanguineum.

On the slope of Mt. Bailey a little above the elevation of the lake the lodge pole pine gives way to good timber; P. monticola, P. ponderosa, and Abies nobilis. Very few Ribes of any kind were seen on Mt. Bailey.

Crater Creek was scouted from the meadow down stream with the object of studying the effect of beaver work on Ribes distribution and if possible to locate a permanent plot study of beaver work on R. bracteosum.

There was no indication from this area that beaver have very much effect on the distribution of R. lacustre. There was no place that they had eaten any and no place that any bushes had been drowned out as result of flooding. There were no slides or worn trails found that would cause the germination of Ribes. There was evidence that beavers do considerable damage to white pine, especially in the early spring orwhen snow is on. They then eat out the tops of the small trees. During the summer they apparently do not bother the white pine to any extent but confine their efforts to lodge pole, hemlock and white fir.

to any extent but confine their efforts to lodge pole, hemlock and white fir.

During the summer they apparently do not bother the white pine trees. During the summer they apparently do not bother the white pine spring or when snow is on. They then eat out the tops of the small

There was no indication from this area that beaver have very much effect on the distribution of P. tacoensis. There was no place that they had eaten any and no place that any bushes had been drowned out as result of flooding. There were no slides or worn trails found that would cause the germination of Ribes. There was evidence that beavers do considerable damage to white pine, especially in the early

Crater Creek was accated from the meadow down stream with the object of studying the effect of beaver work on Ribes distribution and if possible to locate a permanent plot study of beaver work on P. tracteorum.

On the slope of Mt. Bailey a little above the elevation of the lake the lodge pole gives way to good timber; P. monticola, P. ponderosa, and Abies nobilis. Very few Ribes of any kind were seen on Mt. Bailer.

The timber around Diamond Lake is largely lodge pole and yellow pine. Ribes are rather numerous. R. cereum, R. lacustre, R. erosulta and R. binominata are common, and occasionally there is a area of R. viscosissimum and R. sanguineum.

The burn itself was a rather severe one, and very little timber has started to come in. The whole burn is a veritable pasture of Ribes. They are so numerous that no attempt was made to count them. Near the top of the ridge where the timber was mostly thin before the fire, the R. cereum seems to have lived through the fire, as many of the bushes are 12 to 15 years of age. Within the main body of the burn, the tops of all bushes were killed, but the roots were not, and these have sent up new growth, about 8 or 9 years old. Brush is not very thick on the burn, there being some Corylus and Ceanothus. In point of numbers Ribes rank about as follows;

R. binominata, R. viscosissimum, R. lobbii, R. lacustre, R. cereum.

R. sanguineum was noted in this burn or along the trail.

Chipmunks were noted to be eating the fruits of R. binominata and the other species of Ceanothris resembling R. binominata. No evidence could be found that they bother the R. lobbii fruits.

The Diamond Lake country was scouted pretty thoroughly. From the Crater Lake road Ribes cereum is very abundant nearly all along the road, to Diamond Lake. The first 3 or 4 miles is largely lodgepole pine. Then there is about 10 miles of better timber with some sugar pine and white pine. The last 10 miles of the highway to Diamond Lake is nearly all lodge pole pine. Here there is occasionally some R. sanguineum and R. binominata.

Summary : 1. There are no concentrated stands of Ribes of any species along Crater Creek from the meadow down strem two to three miles.

2. R. lacustre was the only species found along the creek.

3. There is no concentrated beaver work along this part of the stream, and no evidence that beavers affect the spread of R. lacustre.

4. There is no place for a R. bracteosum plot in that vicinity.

5. There is some very nice white pine along the creek that ranges up to 3 feet 8 inches in diameter, and comprises 10 to 20% of the stand.

V. General Scouting

1. Material in Hand Requiring Attention in the Future

During a trip to southern Oregon in January, cuttings of several species of Ribes were collected and planted in Corvallis. During the summer and fall, roots and small plants of several species were collected and set out at Corvallis. The following species are represented, most of which are living: R. petiolare, R. wolfii, R. nevadense, R. glutinosum, R. erythrocarpum, G. menziesii, G. cruenta, G. binominata, G. watsoniana, G. marshallii, G. nivea, G. irrigua and G. klamathensis. The thought is that the species which live, be transferred to a suitable place in western Washington where their susceptibility can be studied.

A considerable quantity of dried leaves of the following species are on hand for use in standard counts, surface measurements and similar work: R. bracteosum, R. petiolare, R. acerifolium, R. triste, R. aureum, R. wolfii, R. sanguineum, R. cereum, R. erythrocarpum, R. lacustre, G. menziesii, G. cruenta, G. binominata, G. watsoniana, G. lobbii, G. velutina, G. marshallii, G. nivea, G. irrigua and G. klamathensis.

Seed was collected of the following species for use in germination tests: R. bracteosum, R. petiolare, R. acerifolium, R. triste, R. aureum, R. wolfii, R. nevadense, R. sanguineum, R. viscosissimum, R. cereum R. erythrocarpum, R. lacustre, G. cruenta, G. binominata G. watsoniana, G. lobbii, G. marshallii, G. velutina, G. nivea, G. irrigua, G. klamathensis and G. inermis.

There are also extensive collections of Ribes and other plants for herbarium specimens, which will have to wait available time for attention.

Summary: 1. There are no concentrated stands of Rhus of any species along Crater Creek from the meadow down stream two to three miles.

2. R. laurina was the only species found along the creek.

3. There is no concentrated beaver work along this part of the stream, and no evidence that beavers affect the spread of R. laurina.

4. There do no place for a R. trifoliata plot in that vicinity.

5. There is some very nice white pine along the creek that ranges up to 2 feet 8 inches in diameter, and comprises 10 to 30% of the stand.

B. Boreal Zonation

I. A Boreal Zone Requiring Attention in the Future

During a trip to southern Oregon in January, cuttings of several species of Rhus were collected and planted in Corvallis. During the summer and fall, roots and small plants of several species were collected and set out at Corvallis. The following species are represented, most of which are living: R. pettyae, R. solitaria, R. newtonae, R. flabelliformis, R. ovata, R. membranacea, R. cismontana, R. glabra, R. integrifolia, R. watsoniana, R. macrophylla, R. aromatica, R. trilobata, R. virens. The thought is that the species which be transferred to a suitable place in western Washington where their success can be studied.

A considerable quantity of dried leaves of the following species are on hand for use in standard cuvette, surface measurements and similar work: R. pyroserena, R. petiolaris, R. mearnsii, R. integrifolia, R. virens, R. ovata, R. solitaria, R. membranacea, R. aromatica, R. glabra, R. laurina, R. cismontana, R. trilobata, R. newtonae, R. watsoniana, R. macrophylla, R. virens and R. flabelliformis.

Seed was collected of the following species for use in germination tests: R. pyroserena, R. petiolaris, R. aromatica, R. trilobata, R. virens, R. ovata, R. integrifolia, R. membranacea, R. cismontana, R. glabra, R. laurina, R. solitaria, R. pettyae, R. flabelliformis and R. laurina.

There are also extensive collections of Rhus and other plants for herbarium specimens, which will have to wait available time for attention.

2. Breitenbush and Detroit Region

Santiam National Forest.

This scouting trip was directed primarily towards the Breitenbush planting area in the Santiam National Forest. Starting at Detroit, we went on foot along the Breitenbush River to Breitenbush Hot Springs, thence following the trail, to the planting area, about 8 miles beyond the springs. From here we followed the ridge through the white pine planting, thence into Jefferson Park at the foot of Mt. Jefferson, and returned by the Detriot trail, thus covering in a general way a large section of the Breitenbush drainage.

Purpose: (1) To examine the white pine areas in the Breitenbush planting, with a view to the advisability of carrying on experimental eradication or ecology work.

(2) To secure data on the distribution, abundance and species of Ribes in the regions scouted.

(3) To examine burns of known age for data on Ribes germination and growth after burns.

(4) To make observations on the general conditions of the white pines in this region and compare them with conditions found in the Still Creek Area.

Results: Because of its inaccessability, it was considered impracticable to attempt experimental eradication on this area at present. Because of different conditions of habitat, however, it would be advisable to make some careful ecological studies that would not necessitate a large crew. In about two years, work in this region can be done to a good advantage as a highway will be completed to Breitenbush Hot Springs, thus making the planting area much more accessible.

Ribes sanguineum occurs on the burns along Breitenbush River from Detroit to Jefferson Park. The burned area on which the planting is located has in places an abundance of this species, and the bushes are in very vigorous condition.

Ribes bracteosum was found growing along the open streams of the burned area, and along streams near Breitenbush Hot Springs.

Ribes lacustre grows along streams, generally, throughout the area.

White pine occurs in rather scattered growth from Detroit to the summit of the Cascades.

6. Breitenbush and Detroit Trails

Santiam National Forest.

This examining trip was directed primarily towards the ... Breitenbush planting area in the Santiam National Forest. Starting at Detroit, we went on foot along the Breitenbush River to Breitenbush Hot Springs, thence following the trail, to the planting area, about 8 miles beyond the springs. From here we followed the ridge through the white pine planting, thence into Jefferson Park at the foot of Mt. Jefferson, and returned by the Detroit trail, thus covering in a general way a large section of the Breitenbush drainage.

The purposes: (1) To examine the white pine areas in the Breitenbush planting, with a view to the advisability of carrying on experimental eradication or scaling work.

(2) To secure data on the distribution, abundance and species of Ribes in the regions scouted.

(3) To examine burns of known age for data on Ribes germination and growth after burns.

(4) To make observations on the general conditions of the white pines in this region and compare them with conditions found in the Mill Creek area.

Results: Because of its inaccessibility, it was considered impracticable to attempt experimental eradication on this area at present. Because of different conditions of habitat, however, it would be advisable to make some careful ecological studies that would not necessitate a large crew. In about two years, work in this region can be done to a good advantage as a highway will be completed to Breitenbush Hot Springs, thus making the planting area much more accessible.

Ribes occurrence occurs on the burns along Breitenbush River from Detroit to Jefferson Park. The burned area on which the planting is located has in places an abundance of this species, and the bushes are in very vigorous condition.

Ribes occurrence was found growing along the ocean shores of the burned area, and along streams near Breitenbush Hot Springs.

Ribes localities were rare, generally, throughout the area.

White pine occurs in rather scattered growth from Detroit to the summit of the ridge.

General scouting of burns for Ribes in the vicinity of Detroit seemed to indicate that the majority of Ribes growing on such burns came in the year following the burn.

The white pines in the plantings in this section are generally inferior to those in the Still Creek area. This, however, seems to be due to a soil condition and not to disease.

Future Work: Some ecology plots should be established in this planting area and vicinity.

(1) These plots should aim to secure data growth, vigor and reproduction, and shading out of Ribes bracteosum and Ribes sanguineum.

(2) Large areas of bare, burned over ridges are found in this region, and an extensive scouting should be made to determine the abundance and distribution of the Ribes species. This information would be of value in deciding whether further plantings of white pine would be practicable in this district.

(3) A scouting trip should be made into the region between Fish Lake Ranger Station and Whitewater Creek to get more careful data on: (1) Amount and vigor of white pine; (2) Abundance, distribution, and species of Ribes; (3) Diseases of white pine reported from this region by various forestry people. On such a scouting trip data should be secured which would throw light on the possibilities of this region as a white pine producer under natural conditions, under proper forest management, or under a program of Ribes eradication. This region is being opened up by a good forestry highway.

3. Northeastern Oregon

A trip to northeastern Oregon was made to collect fruits, leaves, and small plants for propagation of the species of Ribes growing in northeastern Oregon.

A brief summary of the work accomplished on this trip is as follows:

Ribes bracteosum fruits were collected in abundance in Still Creek area.

Ribes sanguineum fruits were collected in the Still Creek area.

general scouring of burns for Ribes in the vicinity of
Detroit seemed to indicate that the majority of Ribes growing on
such burns came in the year following the burn.

The white pines in the planting in this section are
generally inferior to those in the Still Creek area. This, however,
seems to be due to a soil condition and not to disease.

Future work: Some ecology plots should be established
in this planting area and vicinity.

(1) These plots should aim to secure data on rate of growth, vigor
and reproduction, and checking out of Ribes bracteosum and Ribes
sanguineum.

(2) Large areas of burn, burned over ridges are found
in this region, and an extensive scouring should be made to deter-
mine the abundance and distribution of the Ribes species. This
information would be of value in deciding whether further plant-
ings of white pine would be practicable in this district.

(3) A scouring trip should be made into the region between
Pine Lake Ranger Station and Whitewater Creek to get more careful
data on: (1) Amount and vigor of white pine; (2) Abundance, dis-
tribution, and species of Ribes; (3) Diseases of white pine re-
ported from this region by various forestry people. On such a
scouring trip data should be secured which would throw light on
the possibilities of this region as a white pine producer under nat-
ural conditions, under proper forest management, or under a program
of Ribes eradication. This region is being opened up by a good
forestry highway.

Northwestern Oregon

A trip to northwestern Oregon was made to collect fruits,
leaves, and small plants for propagation of the species of Ribes
growing in northwestern Oregon.

A brief summary of the work accomplished on this trip is
as follows:

Ribes bracteosum fruits were collected in abundance in
Still Creek area.

Ribes sanguineum fruits were collected in the Still Creek
area.

Grossularia watsoniana fruits and plants were collected near Robin Hood Camp, east of Mount Hood in Mount Hood National Forest.

Ribes aureum fruits, leaves and plants were collected along the highway between Pendleton and La Grande.

Ribes wolfii leaves and plants were collected in the Umatilla National Forest. The fruits were all gone at this season.

G. nivea leaves, fruits, and plants were collected along streams in northeastern part of state.

Ribes petiolare fruits, leaves and plants were collected at Wallowa Lake, northeastern Oregon.

Grossularia irrigua leaves and plants were collected at Wallowa Lake. The fruiting season was past at this time. A possible new species or variety of G. irrigua collected in 1922 by Professor W. E. Lawrence could not be identified because of lack of fruit.

Future work: The following proposed projects were not completed on this trip.

1. Collections of fruits of G. irrigua, R. wolfii and and R. aureum should be made in connection with scout or inspection work as the fruits of these species were gone at this season, on this scouting trip.

2. A collection of fruit, berries and roots of a reported new species related to G. velutina along the tributaries of the Snake River should be made. This species was not located at this time.

3. A collection of fruits, leaves and roots of a reported new species or variety of G. irrigua, reported near Wallowa Lake, should be made.

This work should only be undertaken in connection with preliminary scouting for inspection points and in connection with scouting for blister rust.

Prosopistylis watsoniana fruits and plants were collected near Robin Hood Camp, east of Mount Hood in Mount Hood National Forest.

Ribes aureum fruits, leaves and plants were collected along the highway between Pendleton and La Grande.

Ribes velutinum leaves and plants were collected in the Umatilla National Forest. The fruits were all gone at this season.

R. nivea leaves, fruits, and plants were collected along streams in northeastern part of state.

Ribes petiolare fruits, leaves and plants were collected at Wallowa Lake, Northeastern Oregon.

Prosopistylis irrigua leaves and plants were collected at Wallowa Lake. The fruiting season was past at this time. A possible new species or variety of P. irrigua collected in 1934 by Professor W. E. Lawrence could not be identified because of lack of fruit.

Future work: The following proposed projects were not completed on this trip.

1. Collections of fruits of P. irrigua, P. wolfii and P. aureum should be made in connection with monthly inspection work on the fruits of these species were done at this season, on this coming trip.

2. A collection of fruit, berries and roots of a reported new species related to P. velutina along the tributaries of the Snake River should be made. This species was not located at this time.

3. A collection of fruits, leaves and roots of a reported new species or variety of P. irrigua, reported near Wallowa Lake, should be made.

This work should only be undertaken in connection with preliminary scouting for inspection points and in connection with scouting for blister rust.

4. Scouting for Blister Rust

Scouting for blister rust took somewhat the same character as that of last year. Before closing the regular field work in eradication and ecology, thorough inspections were made in the area where the field force was located. This included the region about Prospect and that about Still Creek in particular. Sipe and Evinger made a special trip to the Still Creek area early in September, at which time this region was scouted to some extent. Stephens and Fehren each inspected many bushes of many varieties in connection with their nursery inspection work during the summer. Stephens worked during the early part of the season in southern Oregon, extending his efforts as far east as the Steins Mountains in southeastern Oregon. Fehren's efforts took him through the northwestern counties and as far east as Hood River and Wasco counties. Pendleton and Goodding inspected in the Siskiyous early in September. All of this was prior to the inspection starting September 12th, which became intensively blister rust inspection.

It is impossible to enumerate the inspection points in northwestern and northern Oregon. Often one inspection point extended along a stream for three or four miles, and in the Saddle Mountain section R. bracteosum is literally everywhere along the numerous streams. Late in the season Edmunds and Joy attempted to locate cultivated black currants in Clackamas County, in order to locate the disease in that county if possible, but in spite of the fact that they went from the main highways into the more unfrequented farm areas, they failed to find the black currants. Many inspections were made on G. divaricata and R. sanguineum, but never with any success. R. bracteosum, in the absence of R. nigrum, continues to be our best host for the detection of the disease.

A trip to eastern Oregon was not effective as it was made late in the year. However a few worth while observations were made:

(1) Strong, moist winds blow up the Columbia and spread to the north, east and south. These winds may carry spores from any infected pines on the slopes of Mt. St. Helens, Mt. Adams or Mt. Hood. The danger to south Idaho is evident.

(2) Ribes are common along most of the stream valleys. Ribes aureum and Ribes cereum are abundant along the Columbia for many miles above The Dalles. Grossularia cognata is common on the

4. Trouble for Blister Rust

Scouting for blister rust took somewhat the same character as that of last year. Before closing the regular field work in eradication and ecology, thorough inspections were made in the area where the field force was located. This included the region about Prospect and that about Still Creek in particular. Hipe and Dvinger made a special trip to the Still Creek area early in September, at which time this region was scouted to some extent. Stephens and Osborn each inspected many bushes of many varieties in connection with their nursery inspection work during the summer. Stephens worked during the early part of the season in southern Oregon, extending his efforts as far east as the Steins Mountains in southeastern Oregon. Osborn's efforts took him through the northwestern counties and as far east as Hood River and Wasco counties. Pendleton and Spaulding inspected in the Pinelyons early in September. All of this was prior to the inspection starting September 15th, which became intensively blister rust inspection.

It is impossible to enumerate the inspection points in northwestern and northern Oregon. Often one inspection point extended along a stream for three or four miles, and in the Cascade mountain section E. breviscapum is literally everywhere along the numerous streams. Late in the season Mannels and Jay started to locate cultivated black currants in Clackamas County, in order to locate the disease in that county if possible, but in spite of the fact that they went from the main highways into the more unfrequented farm areas, they failed to find the black currants. Many inspections were made on R. divaricata and R. sanguineum, but never with any success. R. bracteosum, in the Cascades of R. petiolare, continues to be our best host for the detection of the disease.

A trip to eastern Oregon was not effective as it was made late in the year. However a few notes while observations were made:

(1) Strong, moist winds blow up the Columbia and spread to the north, east and south. White pine may carry spores from any infected pines on the slopes of Mt. St. Helens, Mt. Adams or Mt. Hood. The danger to north Idaho is evident.

(2) Ribes are common along most of the stream valleys. Ribes aureum and Ribes cereum are abundant along the Columbia for many miles above The Dalles. Grossularia cognata is common on the

Umatilla and other streams, heading in the Blue Mountains along the north facing slopes. Ribes petiolare and Ribes lacustre are common at higher altitudes on these streams.

(3) White pines, even cultivated ones, are fortunately scarce.

A summary of the blister rust infection points discovered is as follows;

TABLE NO. 15

County	Host	No. of Locations	No. of Bushes	Per Cent Infection
Hood River	R. bract.	2	6	5-20
Multnomah	R. bract.	3	3	10-20
	R. nigrum	2	11	25-30
Columbia	R. bract.	3	5	1-15
Clatsop	R. bract.	3	8	75-95
Total		13	33	

VI. Nursery Projects

A. Ryderwood Nursery

The Ryderwood Nursery is located near the junction of Campbell Creek and Stillwater Creek. The valley in which the nursery and Ryderwood are situated is surrounded by quite densely forested hills with almost innumerable streams of varying sizes. Stillwater Creek within the mile zone receives Campbell Creek and Becker Creek besides two or three other well defined streams and numerous springs. Becker Creek is swampy through its entire course. Campbell Creek has several side streams which are swampy.

Much of the land in this immediate section has been cut over and burned over within the last five or six years. Much of this is covered with fallen logs, and especially along the streams the land is brushy and in places almost impenetrable masses of debris from the logging operations occur.

The Blister Rust Office can ill afford to undertake any sanitary measures on the Ryderwood Nursery, because

Deadfall and other streams, heading in the Pine Mountains along the north facing slopes. Ribbon pedicularis and Ribes lacustre are common at higher altitudes on these streams.

(8) White pines, even cultivated ones, are fortunately scarce.

A summary of the Blister rust infection points discovered is as follows:

TABLE No. 13

County	Host	No. of Locations	No. of Cases	Per Cent Infection
Bend River	R. bract.	9	9	5-6
	R. ursol.	3	6	10-12
Whitewood	R. nivosa	8	11	25-27
Delmont	R. bract.	7	8	1-15
Clifton	R. bract.	3	8	75-90
Total		11	32	

VI. Forestry Problems

A. Hydrewood Nursery

The Hydrewood Nursery is located near the junction of Campbell Creek and Stillwater Creek. The valley in which nursery and Hydrewood are situated is surrounded by quite dense forested hills with almost innumerable streams of varying sizes. Stillwater Creek within the mile zone receives Campbell Creek and Beaver Creek besides two or three other well defined streams and numerous springs. Beaver Creek is swampy through its entire course. Campbell Creek has several side streams which are swampy.

Much of the land in this immediate section has been cut over and burned over within the last five or six years. Much of this is covered with fallen logs, and especially along the streams the land is brushy and in places almost impenetrable masses of debris from the logging operations occur.

The Blister Rust Office can ill afford to undertake any sanitary measures on the Hydrewood Nursery, because

1. R. bracteosum is very abundant in many places, and these places are difficult to scout and the bushes hard to eradicate.

2. There is no assurance of R. bracteosum remaining eradicated after once the job is done, for there is too much stream above all of which is excellent R. bracteosum territory from which seeds and broken branches can be washed at times of high water.

3. The scouting each year will of necessity be expensive because of the difficult stream types.

4. Heavy concentration of R. sanguineum occurring beyond the 1500 foot zone must be held under suspicion as a spreader of the rust and as a constant seed supply to continually restock the alluvial land within the 1500 foot zone.

5. There are many places where white pines can be grown where the cost of sanitation will be a small per cent of what the cost must be at Ryderwood.

6. R. bracteosum in these tangled masses must be eradicated by means of chemicals. At the present time we do not know anything about the chemical eradication of this species.

The first cost of eradication on this area could not be kept within $5,000, and eradication each succeeding year would of necessity be expensive.

B. Wind River Nursery

As the Wind River Nursery and arboretum cover a large area, a circle of 2,080 feet radius must be eradicated in order to provide a 1500 foot protective zone around the entire planted ground. The radii of this circle in the 8 cardinal directions were scouted to a distance of 1500 feet from the center of the Nursery. R. sanguineum was the only species encountered and this was found in only two locations. There are three bushes under cultivation on the station grounds, 2 R. aureum and 1 R. sanguineum. Twenty acres of the 1500-foot zone are under cultivation and about 10 acres are cleared for buildings and other purposes.

The mile zone was scouted quite thoroughly along the water courses and draws. Most of the streams dry up in early summer. These are apparently free from R. bracteosum. R. sanguineum, beyond the 1500 feet zone and within the mile zone, evidently does not occur in

1. B. bracteosum is very abundant in many places, and these places are difficult to scout and the Bureau hard to eradicate.

2. There is no assurance of B. bracteosum remaining eradicated after once the job is done, for there is too much stream above all of which is excellent B. bracteosum territory from which seeds and broken branches can be washed at times of high water.

3. The scouting each year will of necessity be expensive because of the difficult stream type.

4. Heavy concentration of B. sempervirens occurring beyond the 1500 foot zone may be held under suppression as a spreader of the rust and as a constant seed supply to continually reinfect the adjacent land within the 1500 foot zone.

5. There are many places where white pines can be grown where the cost of sanitation will be a small per cent of what the cost must be at Idaho.

6. B. bracteosum in these tangled masses must be eradicated by means of chemicals. At the present time we do not know anything about the chemical eradication of this species.

The first cost of eradication on this area could not be kept within $5,000, and eradication each succeeding year would of necessity be expensive.

B. Wind River Nursery

As the Wind River Nursery and arboretum cover a large area, a circle of 2,080 feet radius must be eradicated in order to provide a 1500 foot protective zone around the entire planted ground. The radii of this circle in the 8 cardinal directions were mapped to a distance of 1800 feet from the center of the Nursery. B. bracteosum was the only species encountered and this was found in only two locations. There are three Ribes under cultivation on the station grounds, R. petiolare and R. sanguineum. Twenty acres of the 1500-foot zone are under cultivation and about 10 acres are cleared for building and other purposes.

The mile zone was scouted quite thoroughly along the water courses and draws. Most of the streams dry up in early summer. These are apparently free from B. bracteosum. R. sanguineum, beyond the 1500 foot zone and within the mile zone, evidently does not occur in

any concentration.

Ribes bracteosum is found on the upper section of Martha Creek. This is the worst part of the entire area. The stream is swampy in places for some distance from the main water course and R. bracteosum is sparsely scattered throughout, though mostly along the water course. On the central portion of Martha Creek R. bracteosum occurs in patches of fifteen to twenty bushes near the upper section but only intermittently farther down stream. The lower section of Martha Creek dries up during the summer and appears to be Ribes-free. There is very little brush along this portion of the stream and almost barren land occurs on either side with no R. sanguineum therein.

On Trout Creek there is much swampy land favorable to R. bracteosum but none were found nearer than ½ mile from the dam. One large bush occurs just beyond the ½ mile limit.

No Ribes were found on the stream running past the Hutchins ranch nor in the swampy region north of Trout Creek and northwest of the Hutchins ranch.

Estimate of Cost for the Wind River Project

This project should be divided into two types as follows:

1. All the area except stream type within the 1500 foot zone from the outer extremeties of the nursery and the arboretum.

Apparently this work could be done by an extensive scout crew because of the apparent absence of Ribes, except on the upper hillside west of the nursery, although the job, however, must be done so that there will be no chance of Ribes being left on such an important area, and an intensive scout crew of three or four experienced men should be used. This job can be done for 75¢ to $1.00 per acre. There are about 550 acres in the 1500 foot zone and the nursery grounds proper.

2. Stream type on Martha Creek, Trout Creek from the dam west and the swamp region northwest of the dam.

These all extend to the 1 mile limit. The area is probably about 30 acres in extent and could be worked at a probable average cost of $10.00 per acre. This will insure a satisfactory job.

any concentration.

Ribes hirtellum is found on the upper section of Martha Creek. This is the worst part of the entire area. The stream is swampy in places for some distance from the main water course and P. ponderosa is sparsely scattered throughout, though mostly along the water course. On the central portion of Martha Creek R. hirtellum occurs in patches of fifteen to twenty bushes near the upper section but only intermittently further down stream. The lower section of Martha Creek dries up during the summer and appears to be Ribes-free. There is very little brush along this portion of the stream and almost barren land occurs on either side with no R. hirtellum therein.

On Trout Creek there is much swampy land favorable to R. hirtellum but none were found nearer than ½ mile from the dam. The large brush occurs just beyond the ½ mile limit.

No Ribes were found on the stream running past the Hutchins ranch nor in the swampy region north of Trout Creek and northwest of the Hutchins ranch.

Estimate of Cost for the Ribes Eradication Project

This project should be divided into two types as follows:

1. All the area except stream type within the 1500 foot zone from the outer extremities of the nursery and the arboretum.

Apparently this work could be done by an extensive scout crew because of the apparent absence of Ribes, except on the upper hillside west of the nursery, although the job, however, must be done so that there will be no chance of Ribes being left on such an important area, and an intensive scout crew of three or four experienced men should be used. This job can be done for 75¢ to $1.00 per acre. There are about 580 acres in the 1500 foot zone and the nursery fencing proper.

2. Stream type on Martha Creek, Trout Creek from the dam west and the swamp region northwest of the Inn.

These all extend to the 1 mile limit. The area is probably about 30 acres in extent and could be worked at a probable average cost of $10.00 per acre. This will insure a satisfactory job.

VII. Recommendations

A. Ecology

The ecology work started during 1927 will need to be followed up carefully. Some new work should be started. This should be the investigation of species not thus far studied.

Ribes careum is abundant in the dryer sections of the sugar pine region and is frequently associated with western white pine. West of Crater Lake and south of Diamond Lake, it is associated with both species of pines. East of Crater Lake the association with sugar pine is constant. A little ecology work was started this year on this species, but the study must include more territory and several angles not covered in this year's ecology plots.

Grossularia velutina occurs only in the dry belt, but it is there so universal that it must be very generally associated with sugar pine. Nothing has been done thus far with this species ecologically.

Grossularia binominata occurs much more commonly in the sugar pine region than was at first supposed. There are many sections in the Rogue River water shed where this species will need to be eradicated eventually.

Ribes erythrocarpum, because of its strategic position, may become a real menace when blister rust reaches southern Oregon. It is not so limited in distribution nor so rare as was thought, and growing as it does on the exposed ridges in association with Pinus albicaulis, it may do considerable damage. It should receive some attention.

Grossularia Marshallii should be investigated chiefly to determine its probable range and possible association with pines. Unless it proves to have a much wider distribution than our present knowledge suggests, intensive ecological study will be unnecessary.

Grossularia menziesii and Ribes glutinosum are extremely abundant near the coast. The former seems to extend farther back from the coast and to be associated with sugar pine to some extent. It is extremely pernicious because of its habit of keeping green leavesthroughout the year. Both these species deserve more field study and possibly some intensive ecological plot work.

Ribes suppression rather than eradication should become the word in forest management. The Mississippi floods has brought forward the idea of reforestation to a position of importance, and it is likely to be practiced extensively over great areas of national forest in the next ten to twenty years. If Ribes can be suppressed along streams by valuable trees species, and either natural or artificial planting of white pines take place on the land which is either Ribes-free or which can

III. Recommendations

A. Ecology

The ecology work started during 1937 will need to be followed up carefully. New new work should be started. This should be the investigation of species not thus far studied.

Ribes cereum is abundant in the dryer sections of the sugar pine region and is frequently associated with western white pine. west of Crater Lake and south of Diamond Lake. It is associated with both species of pines. West of Crater Lake the association with sugar pine is constant. A little ecology work was started this year on this species but the study must include more territory and several angles not covered in this year's ecology plots.

Cronartia ribicola occurs only in the dry belt, but it is there so universal that it must be very generally associated with sugar pine. Nothing has been done thus far with this species ecologically.

Cronartia pinomimata occurs much more commonly in the sugar pine region than was at first supposed. There are many sections in the Rogue River water shed where this species will need to be eradicated eventually.

Ribes erythrocarpum, because of its strategic position, may become a real menace when blister rust reaches northern Oregon. It is not so limited in distribution nor so rare as was thought, and growing as it does on the exposed ridges in association with Pinus albicaulis it may do considerable damage. It should receive some attention.

Cronartia Peridermii should be investigated chiefly to determine its probable range and possible association with pines. Unless it proves to have a much wider distribution than our present knowledge suggests, intensive ecological study will be unnecessary.

Cronartia occidentalis and Ribes Cruickshanksii are extremely abundant near the coast. The former seems to extend farther back from the coast and to be associated with sugar pine to some extent. It is extremely pernicious because of its habit of keeping green leaves throughout the year. Both these species deserve more field study and possibly some intensive ecological plot work.

Ribes suppression rather than eradication should become the word in forest management. The Mississippi floods has brought forward the idea of reforestation to a position of importance, and it is likely to be practiced extensively over great areas of national forest in the next ten to twenty years. If Ribes can be suppressed along streams by valuable tree species, and either natural or artificial planting of white pines take place on the land which is either Ribes-free or which ca

be cleared of Ribes at small cost, white pine will be assured a place in the Cascades in the future. If this cannot be done, this species must ultimately be driven from much of the land where it is naturally a significant tree. Some ecology work should be undertaken with the idea in mind of suppression by planting. The Mount Hood National Forest offers thousands of places with conditions right; old burns with streams lined with R. bracteosum and R. lacustre, and the Forest Service is ready to supply seedlings of the proper species in so far as they have them, and to supervise the planting operation if necessary. I think we should, at an early date, try planting such species as Tsuga heterophylla and Abies grandis on an extensive enough scale along two or three of these streams to determine what can actually be accomplished by this method.

B. Eradication

The Forest Service has requested that we undertake the sanitation of the Wind River Nursery and the Still Creek pine area. I recommend that these requests be considered favorably.

There are areas of white pine south of the Columbia which should be protected in the not distant future, not because of their commercial importance, but because of their menace to other regions as centers of rust intensification. This may in the end prove to be too expensive but for many years a conscientious attempt should be made to prevent the establishment of infection centers which are likely to cause extensive infection in Idaho from the west as well as a spread to the south.

The items above mentioned will probably use all the funds available for eradication in this region.

C. Quarantine Inspection

This should be conducted along about the same lines as it was in 1927. Better work should have been done on the Christmas tree shipments. This should be extended to shipments made from southern Oregon, if we are to avoid criticism from California, and more exact data should be gathered.

D. Inspection along the Columbia

The presence of white pines or cultivated black currants along the Columbia above Hood River might prove to be an effective relay for blister rust from the Spirit Lake region or from the Mount Hood region. For this reason, I think a survey should be made along both sides of the river for pines and black currants. Pines present which cannot be readily protected should be removed, as well as the black currants.

be cleared of fibre at small cost, white pine will be secured a place in the Cascades in the future. If this cannot be done, this species must ultimately be driven from much of the land where it is naturally a significant tree. Some ecology work should be undertaken with the idea in mind of suppression by planting. The Mount Hood National Forest offers thousands of places with conditions right; old burns with streams lined with P. ponderosa and P. lasiocarpa, and the Forest Service is ready to supply seedlings of the proper species in so far as they have them, and to supervise the planting operation if necessary. I think we should, at an early date, try planting such species as Tsuga heterophylla and Abies grandis, on an extensive enough scale along two or three of these streams to determine what can actually be accomplished by this method.

B. Eradication

The Forest Service has requested that we undertake the eradication of the Wind River Nursery and the Bull Creek pine area. I recommend that these requests be considered favorably.

There are areas of white pine south of the Columbia which should be protected in the not distant future, not because of their commercial importance, but because of their nearness to other regions as centers of rust intensification. This may in the end prove to be too expensive but for many years a conscientious attempt should be made to prevent the establishment of infection centers which are likely to cause extensive infection in Idaho from the west as well as a spread to the south.

The items above mentioned will probably use all the funds available for eradication in this region.

C. Preventive Inspection

This should be conducted along about the same lines as it was in 1927. Better work should have been done on the Christmas tree shipment. This should be extended to shipments made from southern Oregon, if we are to avoid criticism from California, and more exact data should be gathered.

D. Inspection along the Columbia

The presence of white pines or cultivated black currants along the Columbia above Wood River might prove to be an effective relay for blister rust from the Spirit Lake region or from the Mount Hood region. For this reason, I think a survey should be made along both sides of the river for pines and black currants. Pine & currant rust cannot be readily protected should be removed, as well as the black currants.

E. Scouting for Blister Rust

Some spring scouting will be necessary in the region south of the Columbia. It is not at all certain that blister rust did not gain a foothold here in 1925 and is not already a jump ahead of us. At any rate, the pine and R. bracteosum associations should be carefully scouted out.

Scouting in northeastern Oregon must take place at least a month earlier than it did in 1927. In so far as time and men will permit, the regions of abundant Ribes petiolare should be spotted, especially where it is associated with Pinus albicaulis or Pinus monticola.

K. Housing for Winter Sent

BLISTER RUST CONTROL WORK IN CALIFORNIA
1927

The following is the memorandum of understanding under the terms of which the work in California is organized:

MEMORANDUM OF UNDERSTANDING
between
THE BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
and
THE CALIFORNIA DEPARTMENT OF AGRICULTURE - - THE CALIFORNIA STATE BOARD OF FORESTRY - - and the COLLEGE OF AGRICULTURE, UNIVERSITY OF CALIFORNIA
relative to
Cooperative White Pine Blister Rust Control Work in California,

Effective July 1, 1927.

---------oOo----------

A. The BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control reconnaissance and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. The CALIFORNIA DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease;

(3) Undertake such destruction of white pine or Ribes in California and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work; and

(4) Furnish the State Leader in charge of blister rust control work in California such office space as may be necessary for the proper conduct of his work.

Cooperative White Pine Blister Rust Control Work in California.

Effective July 1, 1927.

A. The BUREAU OF PLANT INDUSTRY agrees to:

(1) Pay the salaries and necessary travel expenses of one or more employees who shall conduct such work;

(2) Assist in systematically locating and destroying cultivated black currants (Ribes nigrum) under state authority;

(3) Inspect plant shipments to supplement blister rust quarantines;

(4) Conduct experiments in control recommendations and local Ribes eradication, demonstrate the practical application of control practices, and obtain data on the spread of the rust; and

(5) Coordinate control activities of the several cooperating states and agencies by furnishing regional leadership and supervision, and to provide employees and the cooperating agencies with blister rust subject matter and technical information.

B. The CALIFORNIA DEPARTMENT OF AGRICULTURE agrees to:

(1) Pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violation of blister rust quarantines;

(2) Use its regular employees, so far as their other duties permit, and direct their work in systematically locating and destroying cultivated black currants, scouting for white pine blister rust and inspecting nurseries for this disease;

(3) Undertake such destruction of white pine or Ribes in California and such enforcement of state laws as may be necessary for the effective prosecution of blister rust control work; and

(4) Furnish the State Leader in charge of blister rust control work in California such office space as may be necessary for the proper conduct of his work.

C. The CALIFORNIA STATE BOARD OF FORESTRY agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, scouting for white pine blister rust and assisting in the compilation of information concerning location, ownership and volume of sugar pine stands as a basis for control work.

D. The COLLEGE OF AGRICULTURE, UNIVERSITY OF CALIFORNIA, agrees to:

(1) Assist employees of the Bureau of Plant Industry, through the University Division of Forestry, by furnishing available technical advise and records;

(2) Provide laboratory facilities, through the University Division of Plant Nutrition, for employees of the Bureau of Plant Industry who are stationed in California to conduct technical studies upon the feasibility of chemical eradication of Ribes.

E. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated at any time by any one of the parties by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as being the best method of control of white pine blister rust in California;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticised by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for host plants destroyed in control work;

(6) For the Fiscal Year 1928, the Bureau of Plant Industry shall contribute in value approximately $19,000 to the support of this cooperative work, the California Department of Agriculture approximately

C. The CALIFORNIA STATE BOARD OF FORESTRY agrees to:

(1) Use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated plant currants, according for white pine blister rust and assisting in the compilation of information concerning location, ownership and volume of sugar pine stands as a basis for control work.

D. The [illegible] agrees to:

(1) Assist employees of the Bureau of Plant Industry, through the University Division of Forestry, by furnishing available technical advice and records;

(2) Provide laboratory facilities, through the University Division of Plant Nutrition, for employees of the Bureau of Plant Industry who are stationed in California to conduct technical studies upon the feasibility of chemical eradication of ribes.

E. IT IS MUTUALLY AGREED that:

(1) This memorandum may be terminated at any time by any one of the parties by written notice, and may be amended by written mutual agreement;

(2) The cooperative plan of work in this memorandum will be followed as me being the best method of control of white pine blister rust in California;

(3) All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to this agreement, that all findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement, and that all specimens collected by any party to this agreement which are suspected of being infected with blister rust shall be submitted promptly to the Bureau of Plant Industry for final determination;

(4) The results of the cooperative work may be published jointly, or upon mutual agreement by either cooperating party, due credit being given to the cooperating agencies. All manuscripts therefor shall be criticized by the cooperating parties before publication; and all form letters, bulletins and any other circulars to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the Bureau of Plant Industry before being printed or distributed;

(5) Obligations by the Bureau of Plant Industry are contingent upon appropriations being made therefor by Congress; and no funds of the United States shall be expended in compensation for cost plants destroyed in control work;

(6) For the Fiscal Year 1934, the Bureau of Plant Industry shall contribute in value approximately $15000 to the support of this cooperative work, the California Department of Agriculture approximately

$9,000, the California State Board of Forestry approximately $5,000, and the College of Agriculture, University of California shall contribute in value approximately $3,000; thereafter the amount to be contributed by each shall be determined and agreed upon by supplemental correspondence.

Date:	Signature:
7/15/27	(s.) G. H. Hecke Director, California Department of Agriculture.
7/14/27	(s.) M. B. Pratt State Forester, California State Board of Forestry.
7/15/27	(s.) M. D. Howard (Assoc.) Dean, College of Agriculture, University of California.
Aug. 5, 1927	(s.) K. F. Kellerman, Chief, Bureau of Plant Industry.

Dean:

7/18/47 (s.) C. E. Teague

Director, California Department of Agriculture.

7/18/47 (s.) C. C. Pratt

State Forester, California State Board of Forestry.

7/18/47 (s.) M. E. Howard (Assoc.)

Dean, College of Agriculture, University of California.

Aug. 8, 1947 (s.) K. T. Talbert

Chief, Bureau of Plant Industry.

BLISTER RUST ACTIVITIES IN CALIFORNIA, 1927

By
George A. Root,
Assistant Pathologist.

Three main projects in white pine blister rust control were conducted in this state during the past year. Besides the usual black currant eradication, there were the experimental eradication of wild Ribes (local control) and control reconnaissance.

The various subjects which will be discussed in this report are taken up as follows:

I. State and Federal Cooperation.
II. Black Currant Eradication.
A. Replanting and Resprouting in Pre-eradicated Areas.
III. Quarantine Inspection.
IV. Nursery Inspection.
V. Educational Work.
A. Panel exhibits.
B. Blister rust film.
C. Fair exhibits.
D. Posters and bulletins.
E. Newspapers.
F. Talks.
VI. Scouting for the Disease.
VII. Recommendations.
VIII. Control Reconnaissance, by E. C. Kenyon.
IX. Experimental Ribes Eradication, by W. V. Benedict.

I. State and Federal Cooperation

No radical changes in the cooperative agreement have been made between the Federal and State agencies. The University of California as a whole is now an agency, because the Division of Forestry and the Division of Agricultural Chemistry are now directly linked with the blister rust work. The latter division has offered Mr. H. R. Offord laboratory facilities for himself and two assistants. The former provides office space for these men and for two others located in Berkeley part of the year. In addition to office space, greenhouse facilities and outdoor plots of ground are provided for Mr. Offord's work.

The State Department of Agriculture and the State Board of Forestry have cooperated to the fullest extent as in the past.

All the offices and field force of the U. S. Forest Service

PILOSELLA RUST ACTIVITIES IN CALIFORNIA, 1932

By
George A. Kent,
Assistant Pathologist.

Three main projects in white pine blister rust control were conducted in this state during the past year. Besides the usual black currant eradication, there were the experimental eradication of wild Ribes (local control) and control reconnaissance.

The various projects which will be discussed in this report are taken up as follows:

I. State and Federal Cooperation.
II. Black Currant Eradication.
A. Replanting and Reinspection in Pre-eradicated Areas.
III. Quarantine Inspection.
IV. Nursery Inspection.
V. Educational Work.
A. Panel exhibits.
B. Blister rust film.
C. Fair exhibits.
D. Posters and bulletins.
E. Newspapers.
F. Talks.
VI. Scouting for the Disease.
VII. Recommendations.
VIII. Control Reconnaissance, by E. C. Kenyon.
IX. Experimental Ribes Eradication, by W. V. Benedict.

I. State and Federal Cooperation

No radical changes in the cooperative agreement have been made between the Federal and State agencies. The University of California as a whole is now an agency, because the Division of Forestry and the Division of Agricultural Chemistry are now directly linked with the blister rust work. The latter division has offered Mr. H. E. Offord laboratory facilities for himself and two assistants. The former provides office space for these men and for two others located in Berkeley part of the year. In addition to office space, greenhouse facilities and outdoor plots of ground are provided for Mr. Offord's work.

The State Department of Agriculture and the State Board of Forestry have cooperated to the fullest extent as in the past.

All the offices and field force of the U. S. Forest Service

have aided in various ways to make the blister rust program a success. This is also true of the Office of Forest Pathology. Private lumber interests have also cooperated.

II. Black Currant Eradication.

This project has been carried on as in the past three years. It should be mentioned that a black currant law prohibiting the sale, propagation and possession of these bushes was passed by the 1927 session of the state legislature. This became effective July 29th. This statute aided considerably this year in the removal of "hold outs."

Six men with three autos were employed for about three months. After four seasons' work, including a recheck in 1927 which netted some new plantings, it might be of interest to bring the list of counties covered and number of plantings and bushes found up to date.

Table No. 1

County	Number Plantings	Number Bushes	County	Number Plantings	Number Bushes
Modoc	6	17	Tuolumne	2	14
Siskiyou	8	57	*Stanislaus	0	0
Del Norte	7	21	*Merced	0	0
Humbolt	270	1,746	Mariposa	0	0
Trinity	2	8	*Madera	0	0
Shasta	8	19	*Fresno	0	0
Lassen	9	45	*Kings	0	0
Mendocino	7	30	*Tulare	0	0
Glenn	0	0	*Inyo	3	18
Tehama	2	3	Mono	0	0
Plumas	26	220	Nevada	86	460
Sierra	17	84	Placer	21	67
Yuba	1	1	El Dorado	12	90
Colusa	1	6	Solano	8	18
Sutter	1	1	*Sacramento		
Lake	7	13	(city excepted)	4	8
Sonoma	52	514	*Marin	23	157
Napa	4	16	Contra Costa	23	65
Yolo	1	2	*San Joaquin	14	87
Butte	18	35	Amador	2	5
Alpine	10	92	Calaveras	2	2
Total	---	---		655	3,921

*Counties covered in 1927. 67 plantings comprising 335 bushes.

The above total includes "hold outs" removed this year. There still remains one "hold out" comprising 12 bushes, the removal of which is not expedient at this time. Of the 57 counties in California, 41

County	Number Planting	Number Species	Name	Number Trees
Alpine	5	17	Deciduous	7
Blackfork	3	57	*Forest Flame	5
Del Norte	7	22	*Harvard	0
Humboldt	270	1,340	Hartness	0
Imperial	2	2	*Solara	0
Inyo	3	12	*Tropica	7
Lassen	9	40	*Tiara	0
Mendocino	7	30	*Tyler	0
Napa	0	0	*Yuma	3
Nevada	2	7	Zero	0
Orange	34	120	Arvela	46
Sierra	17	54	Clover	0
Yuba	1	1	El Dorado	0
Colusa	1	2	Solano	0
Custer	0	1	*Centennial	
Lake	1	12	(after secured)	0
Tulare	22	61	Tulara	0
Kings	4	16	Santa Rita	0
Yolo	1	2	*Sea Breeze	0
Delta	12	35	Hunter	0
Utica	10	32	Local average	2
Total	---	---		0

*Counties covered in 1927. 67 plantings comprising 385 trees.

The above total includes "held over" removed this year. There still remains one "held out" comprising 12 trees, the removal of which is not expedient at this time. Of the 57 counties in California, 41

have been completed. (See map at end of report.) The greater part of the territory covered this year embraced the San Joaquin Valley, which accounts for the comperatively few plantings and bushes found.

Those counties contemplated for eradication in 1928 are as follows: San Francisco, Alameda, San Mateo, Santa Clara, Santa Cruz, San Benito, Monterey, San Luis Obispo, Kern and as many others as time and finances permit.

4. Replanting and Resprouting of black currants in eradicated areas.

The possibility of resprouting or replanting at those places where black currants were previously eradicated is a subject worthy of consideration. It was generally known that some resprouting and replanting would occur but not to quite the extent that recent studies have revealed. We have gone along with this work, tapping new areas, giving little thought to what was taking place in those sections already eradicated. This holds true also in the local control projects. This season has opened up a new vista.

A recheck of this work in California was started in July and continued at certain intervals until November. It was conducted only in those counties where there was a large number of plantings and a corresponding large number of bushes per planting. This fortunately lead into counties where sugar pine is prevalent and into those on the northern border.

The following table will give a complete resume of the study:

have been completed. (See map at end of report.) The greater part of the territory covered this year embraced the San Joaquin Valley, which accounts for the comparatively few plantings and breaks found.

Those counties contemplated for eradication in 1928 are as follows: San Francisco, Alameda, San Mateo, Santa Clara, Santa Cruz, San Benito, Monterey, San Luis Obispo, Kern and as many others as time and finances permit.

4. Replanting and Reporting of Black Currants in eradicated Areas.

The possibility of reporting or replanting at those places where black currants were previously eradicated is a subject worthy of consideration. It is generally known that some reporting and replanting would occur but not to quite the extent that recent studies have revealed. In fact upon start of this work, tapping new areas, giving little thought to work now taking place in those sections already eradicated. This holds true also in the local control projects. This season has opened up a new vista.

A research of this work in California was started in July and continued at certain intervals until November. It was conducted only in those counties where there was a large number of plantings and a correspondingly large number of bushes per planting. This fortunately load into counties where super vine is prevalent and into those on the northern border.

The following table will give a complete review of the state:

Table No. 2

Cultivated Black Current Recheck
California, 1927

County	Number of Plantings Originally Eradicated	Number of Bushes Originally Eradicated	Year of Eradication	Number Plantings Rechecked	Number of Bushes Rechecked	Number of Plantings with Bushes Present	Number of Bushes in Original Plantings	Number of Resprouts	Causes of Resprouts: Root Left in Ground	Crown Left in Ground	Branch or Root Left on Ground	Number of Seedlings	Number of Missed Bushes	Replants: Number of Plantings	Replants: Number of Bushes	Number of new Plantings (new Location)	Number of Bushes
El Dorado	11	82	1926	2	61	--	--	--	--	--	--	--	--	--	--	1	8
Placer	21	67	1926	1	16	--	--	--	--	--	--	--	--	--	--	--	--
Nevada	86	460	"	14	176	4	66	9	1	6	2	9	1	--	--	--	--
Sierra	17	84	"	7	56	5	48	15	3	10	*2	--	1	--	--	--	--
Plumas	24	219	"	11	173	4	101	8	2	6	--	--	(2) 8	--	--	1	1
Lassen	9	45	1924	4	33	1	20	1	--	1	--	1	--	--	--	--	--
Modoc	5	16	"	4	16	3	14	10	2	7	--	--	--	--	--	1	1
Siskiyou	6	32	"	3	11	1	3	1	--	1	--	--	--	--	--	3	19
Del Norte	7	21	"	1	8	--	--	--	--	--	--	--	--	--	--	--	--
Humboldt	261	1,643	1924-25	180	1,468	18	216	24	6	19	--	--	1	11	65	19	83
Sonoma	50	511	1925	15	217	--	--	--	--	--	--	--	--	--	--	2	3
Total	495	3,186		242	2,323	36	468	68	14	50	4	10	11	11	65	27	115

*These two bushes left in a dry creek bed; during rainy season, revived and were in a flourishing condition.

A study of the above table shows that there were bushes at 15% of the locations checked, 10% of which were sprouts, seedling, or missed bushes, and 5% replants. It is interesting to note replantings took place only in one county where there has been some antagonism from the start over the black currant campaign. There were 11 replantings, four of which were received from neighbors. As far as could be ascertained, the remainder were cuttings from old bushes previously removed. This would indicate that it is advisable to remove the bushes entirely from the premises where there is a chance of cuttings being taken and planted.

The total number of sprouts was 68. 14 of which seemed to have come from roots left in the ground, 50 from crowns left in the ground, and 4 from bushes or parts of bushes left on the ground. The roots or crowns left in the ground were in several instances due to carelessness or inefficient work, but in the majority of cases the original bushes were so situated among berry briers, willows and other shrubbery, that it was well nigh impossible to make an absolute eradication the first time.

Seedlings found in one of two places came from seed dropped from 12 original bushes, growing in a backyard garden, in which a faucet had obviously dripped for a long period of time. The soil, a heavy dark loam was thoroughly saturated and provided an ideal condition for seed germination. This is the first instance of the germination of R. nigrum seeds that has come to the attention of the writer.

Bushes missed during the first survey, occurred at five locations. This seemed to be due to the lack of thorough inspection of likely places on the premises. Black currants may be planted at two or more places and concealed from view by other plant growth. This occurred in one instance: the owner showed the scout the location of the bushes in one place, not knowing of two other locations on the premises. On the recheck these two places were found. It is well for the scout to scan all likely places where these bushes might be growing, giving some pretext for a search even if the owner knows of no others on the place.

A search for entirely new plantings in conjunction with this recheck work revealed 27, comprising 115 bushes. Of these 27 plantings, 8 had been set out since the first survey; the owners at three places had reported none (apparently unknowingly) to the scouts, thus leaving 16 which, with very close work, should have been found. There might have been some excuse for seven of these because of being screened from sight. It must be said, however, that at thirteen of these places, no enquiry was made.

In certain sections of Sonoma County, a study was made of the number of houses visited on the first survey. Of a total of 113 rechecked this year, at 28 no one was home. 62 reported that no one called before and 23 reported previous enquiry. One planting was found on this study

A study of the above table shows that there were bushes at 18% of the locations checked, 10% of which were sprouts, seedling, or missed bushes, and 8% replants. It is interesting to note replantings took place only in one county where there has been some emergency from the start over the black currant campaign. There were 11 replantings, four of which were received from neighbors. As far as could be ascertained, the remainder were cuttings from old bushes previously removed. This would indicate that it is advisable to remove the bushes entirely from the premises where there is a chance of cuttings being taken and planted.

The total number of sprouts was 68. 14 of which seemed to have come from roots left in the ground, 30 from crowns left in the ground, and 4 from bushes or parts of bushes left on the ground. The roots or crowns left in the ground were in several instances due to carelessness or inefficient work, but in the majority of cases the original bushes were so situated among berry briers, willows and other shrubbery, that it was well nigh impossible to make an absolute eradication the first t[illegible].

Seedlings found in one of two places came from seed dropped from 12 original bushes, growing in a backyard garden, in which a fence had obviously dripped for a long period of time. The soil, a heavy dark loam was thoroughly saturated and provided an ideal condition for seed germination. This is the first instance of the germination of R. nigrum seeds that has come to the attention of the writer.

Bushes missed during the first survey, occurred at five locations. This seemed to be due to the lack of thorough inspection of likely places on the premises. Black currants may be planted at two or more places and concealed from view by other plant growth. This occurred in one instance: the owner showed the scout the location of the bushes in one place, not knowing of two other locations on the premises. On the recheck these two places were found. It is well for the scout to scan all likely places where these bushes might be growing, giving some pretext for a search even if the owner knows of no others on the place.

A search for entirely new plantings in conjunction with this recheck work revealed 27, comprising 115 bushes. Of these 27 plantings, 8 had been set out since the first survey; the owners at three places had reported none (apparently unknowingly) to the scouts, time leaving 16 which, with very close work, should have been found. There might have been some excuse for seven of these because of being screened from sight. It must be said, however, that at thirteen of these places, no enquiry was made.

In certain sections of Nonoma County, a study was made of the number of houses visited on the first survey. Of a total of 112 rechecks this year, at 26 no one was home. 82 reported that no one called before and 28 reported previous enquiry. One planting was found on this study

but indications pointed that it had been planted after the first survey. The result of this study is not so important as it first may seem. Concerning non-visited houses, it is logical to suppose that occupants or tenants frequently change and other members of a family may have answered this time and not known of a previous enquiry.

It is not necessarily a criterion of poor or inefficient work if all homes are not visited. It lies largely with the judgment of the inspector. Some places obviously show no bushes present. A scout must "sound" his territory and proceed accordingly.

The need of a recheck at least in certain sections is evident as the foregoing study has shown. It seems to be impossible to get an absolute eradication the first time both as to those bushes supposedly removed and those occasionally missed. Then there is the question of replanting which, however, will become a lesser factor as time goes on. The value of recheck work is manifested by the following: (1) it tends to reduce the number of black currants to a minimum, thus carrying out the intent of this particular project; (2) it has educational value in again bringing first hand to the people, the importance of this work and impressing them with the idea that it is not a whirlwind campaign put over once and then forgotten and (3) it offers an opportunity to inspect R. nigrum, conceded to be the best indicator as to the presence of the rust in supposedly non-infected areas.

When should this recheck take place? It is well to wait at least two years after the initial eradication. Several conditions influence the time, however, such as the number of plantings and bushes with the attending attitude of the people toward the work, whether the area is important from a white or sugar pine standpoint and lastly the proximity of the disease to an area or state.

III. Quarantine Inspection

The state authorities thoroughly and efficiently handle this phase of the control work. They have intercepted from January 1 to December 1, 9 shipments, 4 pine and 5 Ribes, in violation of Quarantine No. 63.

IV. Nursery Inspection.

The Horticultural Commissioners and the Superintendent of Nursery Service keep in close touch with the nursery situation. The widespread information disseminated during the past three years regarding the blac currant has reached prospective nurserymen so that none are being pl as far as is known. Two nurseries early in 1927 reported the remov bushes. This makes a total of 29 nurseries which have removed 4,

but indications pointed that it had been planted after the first survey. The results of this study is not so important as it first may seem. Certainly non-visited houses, it is logical to suppose that occupants or tenants frequently change and other members of a family may have answered this time and not known of a previous enquiry.

It is not necessarily a criticism of poor or inefficient work if all houses are not visited. It lies largely with the judgment of the inspector. Some places obviously show no breeding present. A second must "sound" his territory and proceed accordingly.

The need of a recheck at least in certain sections is evident as the former study has shown. It seems to be impossible to get an absolute eradication the first time both as to those houses supposedly removed and those occasionally missed. Then there is the question of reinfesting which, however, will become a lesser factor as time goes on. The value of recheck work is manifested by the following: (1) it tends to reduce the number of black currants to a minimum, thus carrying out the intent of this particular project; (2) it has educational value in again bringing first hand to the people, the importance of this work and impressing them with the idea that it is not a whirlwind campaign put over once and then forgotten and (3) it offers an opportunity to inspect R. ribes, conceded to be the best indicator as to the presence of the rust in supposedly non-infected areas.

When should this recheck take place? It is well to wait at least two years after the initial eradication. Several conditions influence the time, however, such as the number of plantings and homes with the attending attitude of the people toward the work, whether the area is important from a white or sugar pine standpoint and lastly the proximity of the disease to an area or state.

III. Quarantine Activities

The state authorities thoroughly and efficiently handle this phase of the control work. They have intercepted from January 1 to December 1, 9 shipments, nine and 5 ribes, in violation of Quarantine No. 68.

IV Nursery Inspection.

The Horticultural Commissioners and the Superintendent of Nursery Service keep in close touch with the nursery situation. The widespread information disseminated during the past three years regarding the black currant has reached prospective nurserymen so that none are being planted as far as is known. Two nurseries early in 1927 reported the removal of ribes. This makes a total of 29 nurseries which have removed 4,

since the program was started in 1924. The black currant scouts have made it their duty to visit the nurseries in the counties in which they were working.

V. Educational Work

A. Panel exhibits: These still continue to fill a gap in the educational program. Care has to be taken to select conspicuous places for their display in order to derive the maximum amount of good.

B. Blister rust film: Although this was not available until after the season had opened, it was shown in two towns and one national park before a combined audience of about 1500 people. Much of the territory covered this year contained few cultivated Ribes of any kind and no forested areas. This seemed to have had a bearing upon the willingness with which the theatre owners responded to showing the film. The film recently formed part of a study of biology classes in one of the state teachers' colleges.

C. Fair exhibits: Curtailment of space this year at the State Fair in Sacramento prevented the usual blister rust exhibit. However, exhibits were set up at the San Joaquin County Fair and the Fresno District Fair, which met with much interest. At the latter fair it was of particular importance because of large sugar pine interests in the county. A small exhibit was set up at the Annual Farm Picnic held at Davis, the seat of the agricultural school of the University.

A permanent exhibit was placed in the museum of the California Academy of Sciences in San Francisco, and a Riker mount showing specimens of the disease was placed in the museum at Yosemite National Park.

D. Posters, bulletins and letters: The usual procedure was followed this year as last, in sending posters with literature to the postmasters of the counties where eradication was to be conducted. Although the posters were not placed in every post office, there was enough to warrant this type of work being continued.

Prior to Forest Protection Week, blister rust information was sent to the 500 high schools, Junior Colleges and Teachers' Colleges of the state. This resulted in further inquiry on the part of many concerning the rust, with requests for specimens.

E. Newspapers: In the absence of the widespread use of the film this season, the newspapers proved to be the best agency for educational work. This was plainly manifest during the recheck work in Humboldt County. The papers in this county are to be commended for the space given to our work.

F. Talks: Opportunities have afforded talks before agricultural

since the program was started in 1924. The block current scouts have made it their duty to visit the nurseries in the counties in which they were working.

I. Educational work

A. Panel exhibits: These still continue to fill a gap in the educational program. Care has to be taken to select conspicuous places for their display in order to derive the maximum amount of good.

B. Winter rest film: Although this was not available until after the season had opened, it was shown in two towns and one national park before a combined audience of about 1500 people. Much of the territory covered this year included the cut-over lands of any kind and no forested area. This seemed to have had a bearing upon the willingness with which the theatre owners responded to showing the film. The film recently formed part of a night of biology classes in one of the state teachers' colleges.

C. Fair exhibits: Curtailment of space this year at the State Fair in Sacramento prevented the usual winter rest exhibit. However, exhibits were set up at the Fresno County Fair and the Tulare District Fair, which met with much interest. At the latter fair it was of particular importance because of large sugar pine interests in the county. A small exhibit was set up at the Annual Farm Floats held at Davis, the seat of the agricultural school of the University.

A permanent exhibit was placed in the museum of the California Academy of Sciences in San Francisco, and a fifty month showing a summary of the disease was placed in the museum at Fresno's Tallest Tree.

D. Printed Bulletins and Letters: The usual procedure was followed this year as last, in sending posters with literature to the postmasters of the counties where eradication was to be conducted. Although the posters were not placed in every post office, there was enough to warrant this type of work being continued.

Prior to Forest Protection Week, blister rust information was sent to the 500 high schools, Junior Colleges and Teachers' Colleges of the state. This resulted in further inquiry on the part of many concerning the rust, with requests for specimens.

E. Newspapers: In the absence of the widespread use of the film this season, the newspapers proved to be the best agency for educational work. This was clearly manifest during the roadside work in Humboldt County. The papers in this county are to be commended for the space given to our work.

F. Talks: Opportunities have afforded talks before agricultural

organizations and schools. At both the spring and fall conventions of the County Horticultural Commissioners' Association, remarks were made on the status of the blister rust. A talk was given before the inspectors of the Office of the Horticultural Commissioner of Los Angeles County. A talk, supplemented by lantern slides, was given before the botany classes of the Chaffey Junior College, located at Ontario, California. At the annual convention of the Association of California Nurserymen held in October, brief remarks were made concerning the rust.

VI. Scouting for the Disease

The presence of the rust again in northwestern Oregon made it advisable to scout along the border. This was done in Del Norte County in the northwestern part of California. Inspection was made of several hundred wild currants (R. bracteosum) at three points in the county, as well as of a few cultivated black currants which were found. Throughout the season, the black currant scouts kept a sharp lookout for presence of the rust in all counties which they covered.

VII. Recommendations

No particular recommendations come to the mind of the writer at this time. If any, they have been incorporated in the discussion of the above subjects.

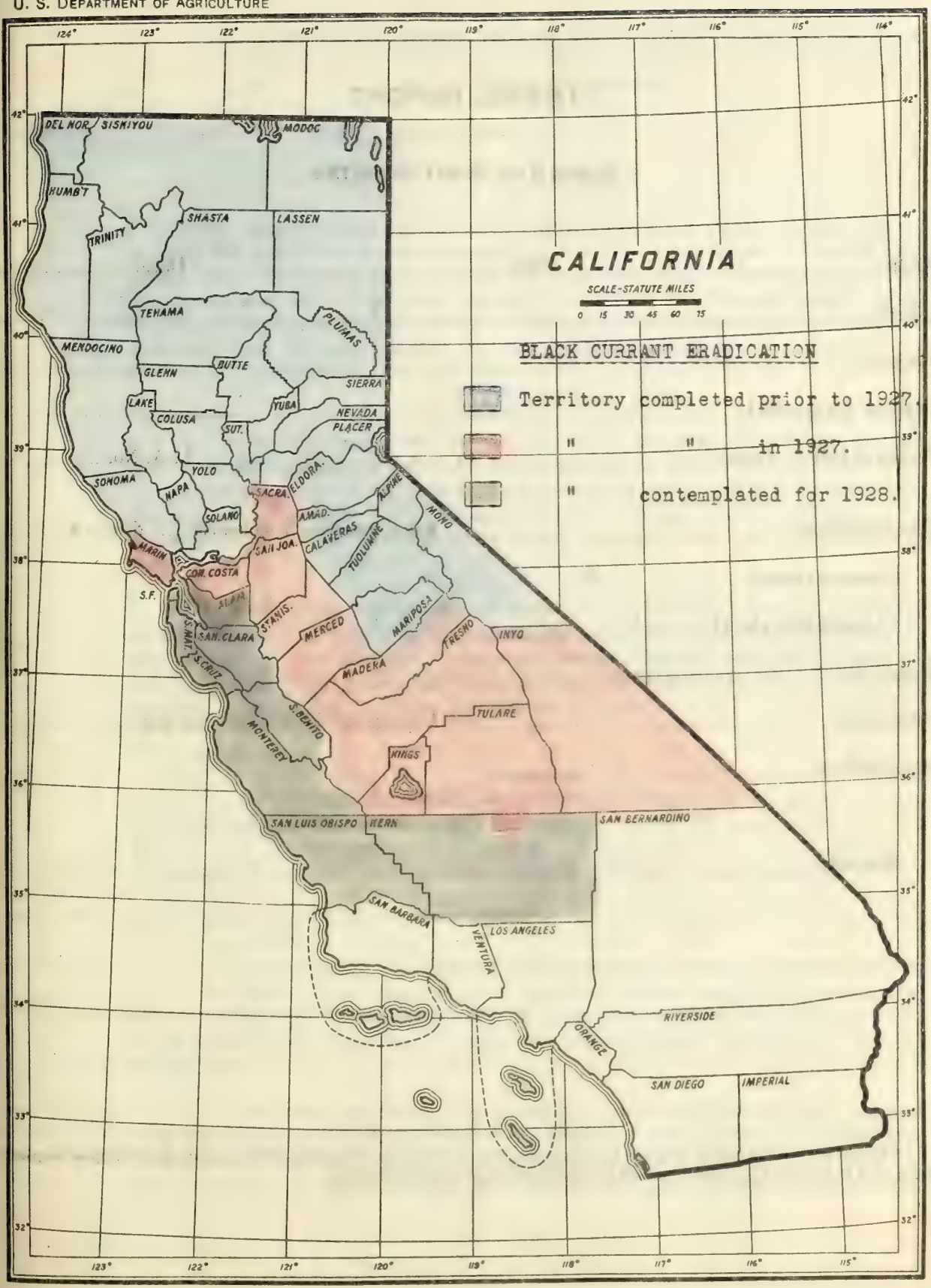
organizations and agencies. At both the spring and fall conventions of the County Horticultural Commissioners' Association, remarks were made on the action of the Olitaire rust. A talk was given before the inspectors of the Office of the Horticultural Commissioner of Los Angeles County. A talk, accompanied by lantern slides, was given before the botany classes of the Jeffey Junior College, located at Ontario, California. At the annual convention of the Association of California Nurserymen held in October, brief remarks were made concerning the rust.

VI. Trapping for the Disease

The presence of the rust again in Northwestern Oregon made it advisable to scout along the border. This was done in Del Norte County in the northwestern part of California. Inspection was made of several thickets with currants (R. bracteosum) at three points in the county, as well as of a few cultivated black currants which were found. Throughout the season, the Plant Quarantine Service kept a sharp lookout for presence of the rust in all countries where they covered.

VII. Recommendations

No particular recommendations come to the mind of the writer at this time. If any, they have been incorporated in the discussion of the above subjects.


CALIFORNIA
SCALE-STATUTE MILES
0 15 30 45 60 75
BLACK CURRANT ERADICATION
Territory completed prior to 1927.
" " in 1927.
" contemplated for 1928.
DEL NOR.
SISKIYOU
MODOC
HUMB'T
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
LAKE
COLUSA
YUBA
NEVADA
SUT.
PLACER
SONOMA
YOLO
NAPA
SACRA.
ELDORA.
ALPINE
MONO
SOLANO
AMAD.
MARIN
SAN JOA.
CALAVERAS
TUOLUMNE
CON. COSTA
S.F.
ALA.
STANIS.
MERCED
MARIPOSA
SAN. CLARA
S. MAT.
S. CRUZ
MADERA
FRESNO
INYO
S. BENITO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SAN BARBARA
VENTURA
LOS ANGELES
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL
124°
123°
122°
121°
120°
119°
118°
117°
116°
115°
114°
42°
41°
40°
39°
38°
37°
36°
35°
34°
33°
32°

TRAVEL REPORT

BUREAU OF PLANT INDUSTRY

Name: ---------- Title: ---------- Date: ----------

Office: ----------

Project: ----------

Purpose (be specific): ----------

Period of travel: From ---------- to ---------- L. A. No. ----------

Transportation: Reimbursement voucher for ---- days $ ----

Common carrier ---------- $ ----

*Automobile, etc. ($ ----) ---- ----

Wages, etc. ---------- ----

Subsistence ---------- ---- Average subsistence cost per day ---- ----

Miscellaneous ---------- ----

Total ---- ----

Remarks: ----------

---

*Where the automobile is occupied by several persons on official business, the total amount should appear in parenthesis, and the amount properly chargeable to the individual in the extension.

VIII. CONTROL RECONNAISSANCE ON FEDERAL LANDS, CALIFORNIA

by
Edgar C. Kenyon,
Agent,

I. Purpose

The purpose of control reconnaissance as performed this past season in California was to make a rapid and systematic survey of the sugar pine areas on the Stanislaus National Forest to determine the location and extent of such areas; the Ribes conditions existing thereon, and the approximate costs of insuring such areas protection from blister rust by the removal of the Ribes bushes.

II. Methods of Work

It was realized at the close of the 1926 field season that a different system of control reconnaissance would have to be used if the Federal sugar pine areas in California upon which a reconnaissance should be made were to be covered in the limited time available, since the method used, a two-man crew strip system, was too slow and also too costly to be continued.

The method adopted as most suitable for obtaining the desired information, considering the elements of time and cost, can best be explained by "Instructions for Performing Control Reconnaissance," a copy of which was given to each man at the beginning of the training period. The paper follows quoted in full:

"I. Purpose.

"The purpose of control reconnaissance is to make a rapid and systematic survey of the sugar pine region to determine (1) the extent and distribution of sugar pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

"II. Methods.

"In brief, the method of performing control reconnaissance is as follows: Each man works a section alone, under the supervision of the Chief of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of sample plots.

"The actual details of work may be considered in 3 steps: (1) The division of a section into eradication types; (2) obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form.

TRAVEL REPORT

BUREAU OF PLANT INDUSTRY

Project:

Purpose (be specific):

Period of travel: to L. A. No.

Reimbursement for ... days $

Common carrier $

Auto, mileage, etc. ($)

Subsistence Average subsistence cost per day

Miscellaneous

Remarks:

"A. Typing: The section and such areas adjacent thereto as can be readily and accurately seen will be covered in such a manner that all types will be sketched in and properly designated as to eradication type. This shall be done by the following method:

"The mapper will cover the section by starting at a section corner, offsetting 10 chains in a cardinal direction along the section line and then running in a cardinal direction through the section. Plot studies will be made 5 chains inside the section from the section line, and at every 10 chains thereafter making 8 plots to the mile, or 2 plots to each forty acres. At the section line a tie will be made to either the section corner or the quarter corner. A return line will be run in the direction opposite to and paralleling that of the first line, 20 chains from the first line, making plot studies as before. A tie will be made at the end of this strip also. In a similar manner the remainder of the section will be covered.

"Lines will be run at right angles to the drainage as near as any cardinal direction will allow in order that all Ribes conditions will be encountered.

"Distances will be measured by pacing, and directions taken by box compass.

"Designation of sugar pine types: Sugar pine--yellow pine (SP-YP): A mixed stand in which sugar pine is the key tree forming approximately 15% or more of the stand, and in which yellow pine and incense cedar are its usual associates. Sugar pine--fir (SP-F): distinguished from the above type by the absence of yellow pine and the prevalence of white fir in its place, sugar pine still being the key tree.

"An eradication type is an area on which eradication working conditions are similar. There are 8 eradication types defined as follows:

"1. Sugar pine-yellow mature: an area containing a mature SP-YP stand of timber generally open, and occurring on warm south to west exposures, usually characterized by a small amount of undergrowth and few Ribes.

"2. Sugar pine-fir mature: an area containing a mature SP-F stand of timber and occurring on cool north to east exposures, usually characterized by a dense coniferous growth with brush and Ribes more or less present.

"3. Sugar pine-yellow pine cutover: an area containing a SP-YP stand occurring on warm south to west exposures, from which the mature trees have been removed leaving more or less reproduction with occasional seed trees, characterized by a small amount of brush and few Ribes.

"A. Typing: The section and each areas adjacent thereto as can be readily and accurately seen will be covered in such a manner that all types will be sketched in and properly designated as to erodication type. This shall be done by the following method:

"The mapper will cover the section by starting at a section corner, offsetting 10 chains in a cardinal direction along the section line and then running in a cardinal direction through the section. Plot studies will be made 5 chains inside the section from the section line, and at every 10 chains thereafter making 8 plots to the mile, or 2 plots to each forty acres. At the section line a tie will be made to either the section corner or the quarter corner. A return line will be run in the direction opposite to and paralleling that of the first line; 20 chains from the first line, making plot studies as before. A tie will be made at the end of this strip also. In a similar manner the remainder of the section will be covered.

"Lines will be run at right angles to the drainage as near as any cardinal direction will allow in order that all Ribes conditions will be encountered.

"Distances will be measured by pacing, and directions taken by box compass.

"Designation of sugar pine types: Sugar pine--yellow pine (SP-YP): A mixed stand in which sugar pine is the key tree forming approximately 15% or more of the stand, and in which yellow pine and incense cedar are its usual associates. Sugar pine--fir (SP-F): distinguished from the above type by the absence of yellow pine and the prevalence of white fir in its place, sugar pine still being the key tree.

"An eradication type is an area on which eradication working conditions are similar. There are 8 eradication types defined as follows:

"1. Sugar pine-yellow mature: an area containing a mature SP-YP stand of timber generally open, and occurring on warm south to west exposures, usually characterized by a small amount of undergrowth and few Ribes.

"2. Sugar pine-fir mature: an area containing a mature SP-F stand of timber and occurring on cool north to east exposures, usually characterized by a dense coniferous growth with brush and Ribes more or less present.

"3. Sugar pine-yellow pine cutover: an area containing a SP-YP stand occurring on warm south to west exposures, from which the mature trees have been removed leaving more or less reproduction with occasional seed trees, characterized by a small amount of brush and few Ribes.

"4. Sugar pine-fir cutover; an area containing a SP-F stand occurring on cool north to east exposures, from which the mature trees have been removed leaving a more or less dense growth of poles, reproduction, and occasional seed trees, characterized by more or less brush and Ribes.

Sec. _____ T. _____ R. _____ Locality

"5. Stream mature: an area varying in width along a stream flowing through mature sugar pine types of timber, which, due to the opening in the timber stand and the presence of moisture, presents a favorable situation for the growth of Ribes.

"6. Stream cutover: an area varying in width along a stream flowing through a sugar pine type cutover area, which, due to the absence of mature trees and the presence of moisture, presents a very favorable situation for the growth of brush and Ribes.

"7. Meadow: an open, level area of 10 acres or more, whose principal vegetation is grass and other herbs; generally characterized by few Ribes.

"8. Brush: an area either cut or burned over, or of waste land on which reproduction has not occurred, but which usually supports a growth of brush and Ribes.

"B. Recording data: Timber data on each type except stream type, will be taken on sample plots. These will be circular plots of a 37 foot radius containing 1/10 of an acre. Ribes data will be obtained from a strip plot 1/4 chain wide and 4 chains long, containing 1/10 of an acre. This latter plot will start from the center of the circular timber plot and will run in the direction of the next plot to be taken. The location of each sample plot should be indicated by a small circle on the map and numbered consecutively 1-32 corresponding to its position on the map sheet.

"On stream types, only Ribes data will be taken, omitting timber data. When a stream having stream type is crossed by the line, two 1/10 acre Ribes plots will be taken. These plots should be taken downstream from the line in every case. Stream type plots will be numbered consecutively, independent of the other type plot numbers, by using the letters of the alphabet enclosed in a small rectangle.

"C. Compilation of data: Upon arrival in camp in the evening all type lines must be jibed with maps previously made. On rainy days and at odd times data must be completely worked up on the section summary sheet, so that by the end of each month the entire work done to date is in final form."

The following forms were used in the field for recording reconnaissance data:

The following forms were used in the field for recording reconnaissance data:

to date in final form."

summary sheet, so that by the end of each month the entire work done and at odd times data must be completely worked up on the section all type lines must be plotted with maps previously made. On each day

"9. Compilation of data: Upon arrival in camp in the evening

rectangle.

numbers, by using the letters of the alphabet enclosed in a small will be numbered consecutively, independent of the other type plot be taken downstream from the line in every case. Stream type plots time, two 1/10 acre Hibee plots will be taken. These plots should timber data. When a stream bearing stream type is crossed by the

"On stream types, only Hibee data will be taken, omitting

corresponding to its position on the map sheet.

by a small circle on the map and numbered consecutively 1-32 corre- to be taken. The location of each sample plot should be indicated circular timber plot and will run in the direction of the next plot

1/10 of an acre. This latter plot will start from the center of the tained from a strip plot 1/4 chain wide and 4 chains long, containing a 37 foot radius containing 1/10 of an acre. Hibee data will be ob- type, will be taken on sample plots. These will be circular plots of

"8. Recording data: Timber data on each type except stream

land on which reproduction has not occurred, but which usually supports a growth of brush and Hibee.

"8. Brush: an area either cut or burned over, or of waste

principal vegetation is grass and other herbs; generally characterized by few Hibee.

"7. Meadow: an open, level area of 10 acres or more, whose

a very favorable situation for the growth of brush and Hibee.

the absence of mature trees and the presence of moisture, presents stream flowing through a sugar pine type cutover area, which, due to

"6. Stream cutover: an area varying in width along a

favorable situation for the growth of Hibee.

opening in the timber stand and the presence of moisture, presents a flowing through mature sugar pine type of timber, which, due to the

"5. Stream mature: an area varying in width along a stream

brush and Hibee.

reproduction, and occasional seed trees, characterized by more or less

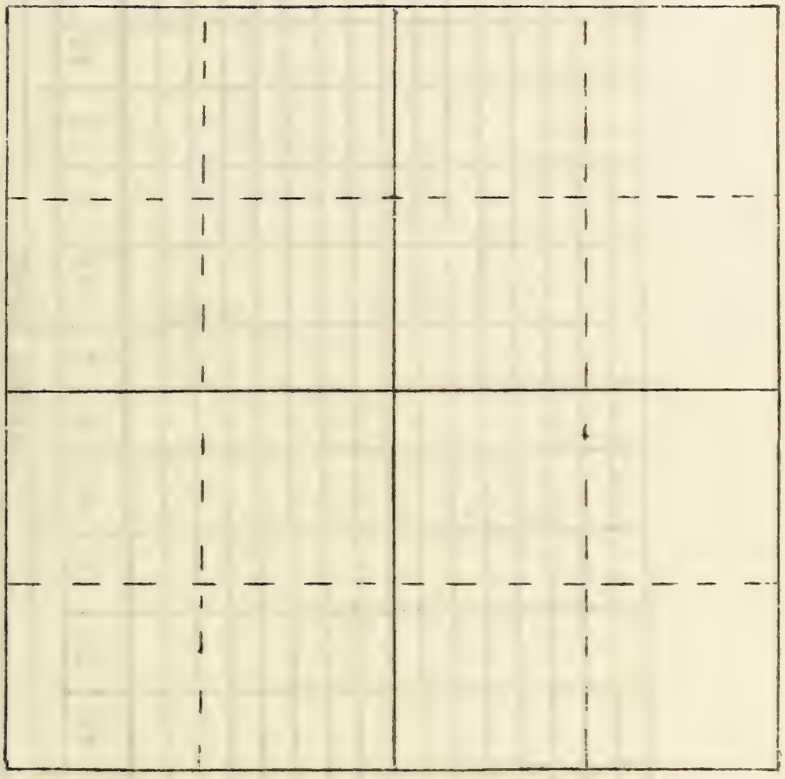
trees have been removed leaving a more or less dense growth of poles, occurring on cool moist to cool exposures, from which the mature

"4. Sugar pine-fir cutover: an area containing a DF-P stand

Sec._____T._____R._____Locality_____

Map and Notes by_____Date_____1927

Scale 4 inches = 1 mile.



Block Tests vs Strain Type																
Block Number																
Test No.	Type Plate No.	1	2	3+	1	2	3+	1	2	3+	1	2	3+	Strain Type	Plate No.	
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

WF-BRC-31-5/1/27

Sec. T. R. Locality

Plot No.	Exp.	Timber 0 - 1 W.P.	Timber 0 - 1 Other	Timber 1 - 6 W.P.	Timber 1 - 6 Other	Timber 6 - 12 W.P.	Timber 6 - 12 Other	Timber Over 12 W.P.	Timber Over 12 Other	Composition Over-story	Composition Under story
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

Ribes Species

Plot No.	R. 1	R. 3	R. 3+	R. 1	R. 3	R. 3+							Brush Den.	Wind fall	Rock T.B.O.
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

Remarks:

Brush Genera:

Sec. N. R. Locality

Plot No.	Inc.	Timber								Composition	
		0 - 1		1 - 6		6 - 11		Over 12		Over-story	Under-story
		W.P.	Other	W.P.	Other	W.P.		W.P.	Other		
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											

Plot Sheet

Plot No.	S.													Total Dec.	Tilt (all)	Dead Trees
	1	2	3	1	2	3	1	2	3	1	2	3				
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
32																

Total Cut
Basal Area

WF-BRC-#2-5/1/27

SECTION SUMMARY

S. T. R. Locality Date 192 .

Erad. Type	Timber Type	Timber Age Class	Type Acres	Trees Per Acre 0 - 1 W. P.	0 - 1 Other	1 - 6 W. P.	1 - 6 Other	6 - 12 W .P.	6 - 12 Other	Over 12 W. P.	Over 12 Other	Composition Story Over	Composition Story Under	Brush Genera	Brush % Dens
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Erad. Type	Ribes Per Acre 1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total	Total Ribes 1	1-3	3+	Total	Wind fall	Rock
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

A. Extensive Reconnaissance.

In addition to those sections worked intensively this past season, a considerable area was worked extensively to which data obtained by intensive reconnaissance could be applied, thereby obtaining more accurate figures on large areas adjacent to those intensively worked.

The method employed in making the extensive reconnaissance was to traverse the ridges around a drainage, typing in on a township map having all available typography on it, the different eradication types seen from various points of good visibility along the ridges. By pacing and orienting with a compass, and checking when not sure of the type, a fair degree of accuracy was obtained.

B. Personnel and Method of Training.

The personnel on reconnaissance this past season consisted of the project leader and four assistants. Approximately a week was spent at the Eradication Camp at Strawberry at the beginning of the field season training the men for the season's work.

During this period one day was spent in going over the written instructions. Several days were spent by all in methods of typing and plot work, checking, pacing and compass running and becoming familiar with the various species of Ribes, trees and brush which were to be encountered during the season.

During the remaining days of the training period, with the exception of a half-day devoted to training them in the method of summarizing the data on a sectional basis, the men worked in eradication crews. This helped them to get the eradication men's side of local control, thus enabling them to better interpret conditions encountered on control reconnaissance.

III. Work Performed and Results Obtained

A. General location.

The Stanislaus National Forest lies on the west slope at approximately the center of the Sierra Nevada, between Townships 3 S - 5 N, Ranges 15-21 E., Mt. Diablo Meridian, and is considered as lying within the optimum range for sugar pine growth. This forest is drained by several large rivers including the Tuolumne in the north, the Stanislaus near the central part and the Mariposa in the south, all of which empty into the San Joaquin River, which in turn empties into San Francisco Bay which lies approximately 100 miles due west of the forest.

The topography is rugged, consisting of deep canyons and high ridges having in some instances a difference of 2500' in elevation. Near the headwaters of the streams the country tends to flatten out, and even lower down high plateaus are common between some of the larger streams.

A. Intensive Reconnaissance.

In addition to those sections worked intensively this past season, a considerable area was worked extensively to which data obtained by intensive reconnaissance could be applied, thereby obtaining more accurate figures on large areas adjacent to those intensively worked.

The method employed in making the extensive reconnaissance was to traverse the ridges around a drainage, typing in on a township map having all available typography on it, the different erodication types seen from various points of good visibility along the ridges. By pacing and orienting with a compass, and checking when not sure of the type, a fair degree of accuracy was obtained.

B. Personnel and Method of Training.

The personnel on reconnaissance this past season consisted of the project leader and four assistants. Approximately a week was spent at the Eradication Camp at Strawberry at the beginning of the field season training the men for the season's work.

During this period one day was spent in going over the written instructions. Several days were spent by all in methods of typing and plot work, checking, pacing and compass running and becoming familiar with the various species of fibes, trees and brush which were to be encountered during the season.

During the remaining days of the training period, with the exception of a half-day devoted to training them in the method of summarizing the data on a sectional basis, the men worked in eradication crews. This helped them to get the eradication man's side of local control, thus enabling them to better interpret conditions encountered on control reconnaissance.

III. Work Performed and Results Obtained

A. General Location.

The Stanislaus National Forest lies on the west slope of approximately the center of the Sierra Nevada, between Townships 2 S - 5 N Ranges 15-21 E., Mt. Diablo Meridian, and is considered as lying within the optimum range for sugar pine growth. This forest is drained by several large rivers including the Mokelumne in the north, the Stanislaus near the central part and the Tuolumne in the south, all of which empty into the San Joaquin River, which in turn empties into San Francisco Bay which lies approximately 100 miles due west of the forest.

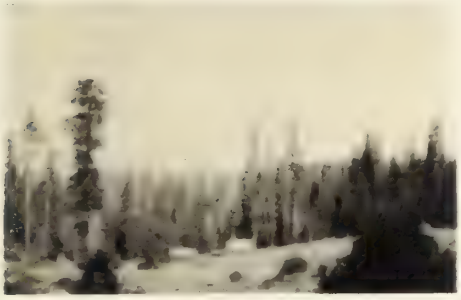
The topography is rugged, consisting of deep canyons and high ridges having in some instances a difference of 8500' in elevation. Near the headwaters of the streams the country tends to flatten out, and even lower down high plateaus are common between zones of the larger streams.



An SP-YP mature type north of Dorrington.



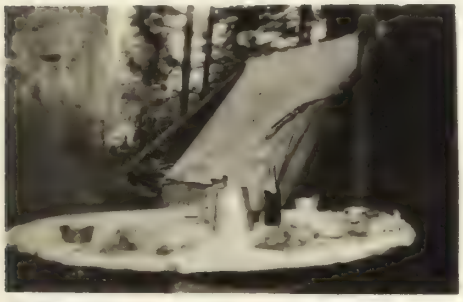
A small mountain meadow in SP-YP mature type near Rosasco's Meadow.



An SP-F mature type near Rosasco's Meadow east of Tuolumne.



A barn constructed of sugar pine shakes, Rosasco's Meadow.



"Soupie, soupie, soupie!" at Dorrington.



A train load of sugar and yellow pine logs, Pickering Lumber, Co., east of Tuolumne.



Moving into Rosasco's Meadow Camp on Pickering R. R.



Outward bound from Rosasco's Meadow Camp on Pickering R R.

The location of the sugar pine type on the Stanislaus is a fine example of the life-zone theory. A type map of the forest shows the sugar pine type running north and south through the length of the forest in a strip about 10 miles wide at an elevation of from 4000' to 6000', variations in the width of the strip occurring directly as changes in elevation occur.

On the western side of the sugar pine type, and at the lower elevations the sugar pine disappears leaving a yellow pine, and at still lower elevations a yellow pine-digger pine type.

On the eastern, or higher side of the sugar pine type, the red and white fir type is found giving way to the sub-alpine types in the higher easternmost parts of the forest.

There are thus these three distinct timber types within the forest occurring at three distinct ranges in elevation.

The sugar pine type which was worked this past season is in itself divided into two distinct types which has simplified the reconnaissance work and reduced the number of eradication types considerably. These two sugar pine types which are classified as eradication types because of the great similarity in working conditions and Ribes growth found within them, are the sugar pine-yellow pine type and the sugar pine-fir type. Almost without variation, on warm, south to west exposures, yellow pine comes in as the chief associate of sugar pine, while on the cooler north to east exposures yellow pine gives way to white fir. The sugar pine-yellow pine type, due to lack of moisture and greater intolerance of yellow pine, is more open and free from brush and generally has few Ribes present, while just the opposite conditions exist in the moister, more tolerant sugar pine-fir types.

The Stanislaus has a good system of roads into much of the sugar pine region. On certain parts of the forest, inaccessible by road, logging operations are under way which makes such areas accessible by railroad. The Pickering Lumber Company very kindly cooperated with this Office in transporting men, supplies and equipment on its logging railroad to and from the country east of Tuolumne where otherwise it would have been necessary to use pack animals.

Sonora, a town of 5,000, and headquarters for the Forest Supervisor, is located just off the middle western side of the forest, from which supplies were purchased for the reconnaissance camp. It made rather a long haul, an average of 100 miles to the round trip to the various camp sites, but due to the fact that supplies were furnished under bid by a grocery store in Sonora to the Eradication Camp at a comparatively low figure, it was thought best to take advantage of the bid prices and purchase reconnaissance supplies there also.

B. Detailed location.

The location of the sugar pine type on the Stanislaus is a fine example of the life-zone theory. A type map of the forest shows the sugar pine type running north and south through the length of the forest in a strip about 10 miles wide at an elevation of from 4000' to 6000', variations in the width of the strip occurring directly as changes in elevation occur.

On the western side of the sugar pine type, and at the lower elevations the sugar pine disappears leaving a yellow pine, and at still lower elevations a yellow pine-digger pine type.

On the eastern, or higher side of the sugar pine type, the red and white fir type is found giving way to the sub-alpine types in the higher easternmost parts of the forest.

There are thus these three distinct timber types within the forest occurring at three distinct ranges in elevation.

The sugar pine type which was worked this past season is in itself divided into two distinct types which has simplified the reconnaissance work and reduced the number of eradication types considerably. These two sugar pine types which are classified as eradication types became of the great similarity in working conditions and Ribes growth found within them, are the sugar pine-yellow pine type and the sugar pine-fir type. Almost without variation, on warm, south to west exposures, yellow pine comes in as the chief associate of sugar pine, while on the cooler north to east exposures yellow pine gives way to white fir. The sugar pine-yellow pine type, due to lack of moisture and generally few Ribes present, while just the opposite conditions exist in the moister, more tolerant sugar pine-fir types.

The Stanislaus has a good system of roads into much of the sugar pine region. On certain parts of the forest, inaccessible by road, logging operations are under way which makes such areas accessible by railroad. The Pickering Lumber Company very kindly cooperated with this Office in transporting men, supplies and equipment on its logging railroad to and from the country east of Tuolumne where otherwise it would have been necessary to use pack animals.

Sonora, a town of 5,000, and headquarters for the Forest Supervisor, is located just off the middle western side of the forest, from which supplies were purchased for the reconnaissance camp. It made rather a long haul, an average of 100 miles to the round trip to the various camp sites, but due to the fact that supplies were furnished under bid by a grocery store in Sonora to the Eradication Camp at a comparatively low figure, it was thought best to take advantage of the bid prices and purchase reconnaissance supplies there also.

B. Detailed Location.

The sugar pine type which was worked during 1927 on the Stanislaus can well be divided into four distinct units as follows:

1. That area lying northwest of the North Fork of the Stanislaus River.

2. That area lying between the North and Middle Forks of the Stanislaus River.

3. That area lying east of Tuolumne in T.2 N., R.18 E.

4. That area lying in the vicinity of Carl Inn.

In applying intensive reconnaissance data to extensively typed areas, all extensive sections worked in each of these units should have that data applied to them which was obtained from sections worked intensively in the same unit. This will insure a more accurate estimate of costs over the entire sugar pine type, than if a weighted average of all units was applied to all extensively typed sections.

Description of conditions existing on units. The unit lying northwest of the North Fork of the Stanislaus River is almost entirely a mature stand of timber, containing several large meadows. There is a small logged area in the southern part of the unit. It has both the rugged and the plateau type of topography, and is readily accessible by automobile. The principal private timber owner is the Ruggles Estate. Brush species present are bear clover, spiny ceanothus, manzanita and chinquapin, a condition similar to that on the three other units but possibly in a lesser density. The Ribes species present, also common to the other three units are, namely: the prickly fruited gooseberry, Grossularia roezli and the Sierra Nevada currant, Ribes nevadense. For a comparison of the number of Ribes per acre for the various units see Table No. 6.

The unit lying between the North and Middle Forks of the Stanislaus River is entirely a mature stand of timber. This area, without question, contains the finest stand of sugar pine to be found on the entire forest. The southern part of the unit contains the south grove of the Calaveras Big Trees, (Sequoia gigantea). It has been noted that site conditions favorable to the Sequoias seem also to be those most favorable to the growth of both sugar pine and Ribes for they occur in these groves in maximum size and density. This unit, accessible only by pack trail, is more rugged and cut up than that of the unit to the west, but contains the same species of brush and Ribes. The Pickering Lumber Company has the largest private holdings within this area.

The unit lying within T.2 N.,R.18 E., presents timber conditions before logging, during logging and after logging. The unlogged portion of the unit has conditions within it similar to those in the aforementioned two units with the exception that a new species of Ribes

The sugar pine type work was worked during 1927 on the Stanislaus can well be divided into four distinct units as follows:

1. That area lying northwest of the North Fork of the Stanislaus River.

2. That area lying between the North and Middle Forks of the Stanislaus River.

3. That area lying east of Tuolumne in T.2 N., R.18 E.

4. That area lying in the vicinity of Carl Inn.

In applying intensive reconnaissance data to extensively typed areas, all extensive sections worked in each of these units should have that data applied to them which was obtained from sections worked intensively in the same unit. This will insure a more accurate estimate of costs over the entire sugar pine type, than if a weighted average of all units was applied to all extensively typed sections.

Description of conditions existing on units. The unit lying northwest of the North Fork of the Stanislaus River is almost entirely a mature stand of timber, containing several large meadows. There is a small logged area in the south end of the unit. It has both the rugged and the plateau type of topography, and is readily accessible by automobile. The principal private timber owner is the Bugbee Estate. Brush species present are bear clover, spiny ceanothus, manzanita and chinquapin, a condition similar to that on the three other units but possibly in a lesser density. The Ribes species present, also common to the other three units are, namely: the prickly fruited gooseberry, Grossularia roezli and the Sierra Nevada currant, Ribes nevadense. For a comparison of the number of Ribes per acre for the various units see Table No. 6.

The unit lying between the North and Middle Forks of the Stanislaus River is entirely a mature stand of timber. This area, without question, contains the finest stand of sugar pine to be found on the entire forest. The southern part of the unit contains the south grove of the Calaveras Big Trees, (Sequoia gigantea). It has been noted that site conditions favorable to the Sequoias seem also to be those most favorable to the growth of both sugar pine and Ribes for they occur in these groves in maximum size and density. This unit, accessible only by pack trail, is more rugged and cut up than that of the unit to the west, but contains the same species of brush and Ribes. The Pickering Lumber Company has the largest private holdings within this area.

The unit lying within T.2 N., R.18 E., presents timber conditions before logging, during logging and after logging. The unlogged portion of the unit has conditions within it similar to those in the aforementioned two units with the exception that a new species of Ribes



Cottage Springs Camp.



Overlooking Dorrington Meadow.



Along the North Fork of the Stanislaus River.



Calaveras Big Trees in association with sugar pine.



A 13-foot sugar pine at Dorrington.

occurs at high elevations, namely, the squaw currant, R. cereum, and that brush and Ribes are more numerous. The unit has a rugged topography, cut up by many large creeks draining in a southerly direction into the Tuolumne River. The western side of the unit was cut in 1921, and now contains dense concentrations of spiny ceanothus and Ribes with very scattering sugar pine reproduction. The conditions on this portion of the unit are similar to the entire township just to the west. The Pickering Lumber Company who is logging in it at present, is the largest private timber holder in this unit. This region is only accessible by logging railroad or pack trail.

The unit lying in the vicinity of Carl Inn is composed of cut-over land in the north and virgin timber in the south. It is drained by the Middle and South Forks of the Tuolumne River and is of a comparatively gentle topography, the ridges between the streams being less steep than are those of the other units. Large mountain meadows occur throughout the unit. Whole sections of sugar pine-yellow pine type occur with an absence of brush and few Ribes. The unit is made very accessible by main and secondary roads. The usual species of brush and Ribes are found on the area. The largest private owner in this unit is the Yosemite Lumber Company who at present is not logging within this unit, but in its vicinity.

C. Results of work.

Table No. 1 shows the per cent of the gross sugar pine type covered in 1927.

Table No. 1

Per Cent of Forest Covered

Classification	Sub-Totals		Totals	
	Acreage	Per cent	Acreage	Per cent
Gross Area of Forest			1,104,412	100.00
Gross Area of S.P. Types	320,000	100.00	320,000	28.97
Area Reconn. Intensively	76,346	23.86		
Area Reconn. Extensively	110,606	34.56		
Total Area Reconnaissanced	186,952	58.42		
Gross Area All Other Types			784,412	71.03

Table No. 2 gives the land descriptions and number of acres on which control reconnaissance, both intensive and extensive, was performed in 1927.

occurs at high elevations, namely, the sugar currant, R. cereum, and that brush and Ribes are more numerous. The unit has a rugged topography, cut up by many large creeks draining in a southerly direction into the Tuolumne River. The western side of the unit was cut in 1921, and now contains dense concentrations of spiny ceanothus and Ribes with very scattering sugar pine reproduction. The conditions on this portion of the unit are similar to the entire township just to the west. The Pickering Lumber Company who is logging in it at present, is the largest private timber holder in this unit. This region is only accessible by logging railroad or pack trail.

The unit lying in the vicinity of Carl Inn is composed of cut-over land in the north and virgin timber in the south. It is drained by the Middle and South Forks of the Tuolumne River and is of a comparatively gentle topography, the ridges between the streams being less steep than are those of the other units. Large mountain meadows occur throughout the unit. Whole sections of sugar pine-yellow pine type occur with an absence of brush and few Ribes. The unit is made very accessible by main and secondary roads. The usual species of brush and Ribes are found on t area. The largest private owner in this unit is the Yosemite Lumber Comp who at present is not logging within this unit, but in its vicinity.

C. Results of work.

Table No. 1 shows the per cent of the gross sugar pine type covered in 1927.

Table No. 1

Per Cent of Forest Covered

Classification	Sub-Total		Total	
	Acreage	Per cent	Acreage	Per cent
Gross Area of Forest			1,104,412	100.00
Gross Area of S.P. Types	290,000	100.00	290,000	26.27
Area Recomm. Intensively	76,346	26.36		
Area Recomm. Extensively	110,606	34.56		
Total Area Recommendanced	186,952	58.42		
Gross Area All Other Types			784,412	71.03

Table No. 2 gives the land descriptions and number of acres on which control reconnaissance, both intensive and extensive, was performed in 1927.

Table No. 2

Sections Worked in Whole or Part

T	R	Intensive Reconnaissance: Sections by Number	Intensive: Total Sec	Intensive: Total Acres	Extensive Reconnaissance: Sections by Number	Extensive: Total Sec	Extensive: Total Acres	Grand Total Sec	Grand Total Acres
7N	15E				1,8,9,10,11,12,13,14,15,16,17, 18,19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36	30	16,903	30	16,903
7N	16E				1,2,3,4,5,6,7,8,9,10,11,12,13, 14,15,16,17,18,19,20,21,22,23, 24,25,26,27,28,29,30,31,32,33, 34,35,36.	36	22,795	36	22,795
6N	15E	3,9,11,13,15,17,21,25, 26,34,35,36.	12	7,680	1,2,4,5,6,7,8,10,12,14,16,18, 19,20,22,23,24,27,28,29,30,31, 32,33.	24	15,360	36	23,040
6N	16E	3,9,11,15,16,17,19,20, 21,27,28,29,30,31,32,33.	16	10,056	1,2,4,5,6,7,8,10,12,13,14,18, 22,23,24,25,26,34,35,36.	20	12,984	36	23,040
5N	15E	1,2,3,4,9,10,11,12,13, 14,15,16,21,22,23,26,27.	17	10,850	5,6,7,8,17,18,19,20,24,25,28, 29,30,31,32,33,34,35,36.	19	12,190	36	23,040
5N	16E	5,6,7,9,10,11,12,13,14, 15,16,21,22,23,24,25, 27,28,33,34,36.	21	13,320	1,2,3,4,8,17,18,19,20,26,29,30 31,32,35.	15	9,720	36	23,040
5N	17E	6,7,16,17,18,19,20,21, 30,31.	10	6,400	4,5,8,9,28,29,32,33.	8	5,120	18	11,520
2N	18E	13,14,15,16,17,20,21,22, 23,24,25,26,27,29,29,32, 33,34,35,36.	20	12,800	18,19,30,31	4	2,560	24	15,360
1S	19E	10,11,14,15,16,17,18,19, 20,21,22,25,26,27,32,33 34,35,36.	19	13,320	1,2,3,4,5,6,7,8,9,12,13,24,24 28,29,30,31.	17	11,064	36	24,384
2S	19E	2,3,4.	3	1,920	1,5,6.	3	1,920	6	3,840
		Totals	118	76,346		176	110,606	294	186,952

Table No. 3 shows the land division on the basis of acreage and per cent of that area on which control reconnaissance, both intensive and extensive was performed in 1927.

Table No. 3

Land Division of Total Area Reconnaissanced

Classification	Acreage	Per Cent
Sugar Pine Types:		
SP-YP Mature	81,684	43.67
SP-YP Cutover	8,961	4.78
SP-F Mature	56,509	30.23
SP-F Cutover	1,394	.75
Totals	148,498	79.43
Stream Types:		
Stream Mature	2,333	1.25
Stream Cutover	149	.08
Totals	2,482	1.33
Other Timber Types:		
Yellow Pine	17,393	9.30
Red and White Fir	8,414	4.50
Totals	25,807	13.80
Non-Forested:		
Meadow	2,169	1.16
Forest Land Not Producing:		
Brush	7,997	4.28
Grand Totals	186,952	100.00

Table No. 4 shows the acreage by erosion types of that area worked extensively in 1927.

Table No. 5 gives an acreage and Ribes control of the area worked intensively in 1927.

Table No. 3 shows the land division on the basis of acreage and per cent of that area on which control recommendations, both intensive and extensive was performed in 1927.

Table No. 3

Classification	Acreage	Per Cent
Timber Type Types:		
I - Douglas Fir	81,694	61.6%
II - Ponderosa Pine	18	4.7%
III - Western White Pine	6,328	23.4%
IV - Larch	1,244	.7%
Total	141,488	78.4%
Other Timber Types:		
Alpine Hemlock	1,821	1.0%
Alpine Cypress	164	.0%
Total	6,485	1.5%
Other Timber Types:		
Yellow Pine	17,382	9.6%
Red and White Fir	8,414	4.6%
Totals	25,807	13.8%
Non-Forested:		
Meadow	3,128	1.1%
Barren Land Not Included:		
Brush	1,857	.6%
Grand Total	178,965	100.0%

Table No. 4 shows the acreage by eradication types of that area worked extensively in 1927.

Table No. 4

Type Division of Area Worked Extensively

Eradication Types	Acres	Per Cent
SP-YP Mature	38,982	35.24
SP-YP Cutover	4,388	3.97
SP-F Mature	33,107	29.93
SP-F Cutover	914	0.83
Stream Mature	1,233	1.12
Stream Cutover	65	0.06
Brush	4,711	4.26
Meadow	1,397	1.26
Non-sugar pine (R.F. and Y. P.)	25,807	23.33
Totals	110,606	100.00

Table No. 5 shows the acreage by eradication types of that area on which reconnaissance, both intensive and extensive, was performed in 1927.

Table No. 5

Type Division of Total Area Reconnaissanced

Eradication Types	Acres	Per Cent
SP-YP Mature	81,634	43.67
SP-YP Cutover	8,961	4.78
SP-F Mature	56,509	30.23
SP-F Cutover	1,394	.75
Stream Mature	2,333	1.25
Stream Cutover	149	.08
Brush	7,997	4.28
Meadow	2,168	1.16
Non-Sugar pine (R.F. and Y.P.)	25,807	13.80
Totals	186,952	100.00

Table No. 6 gives an acreage and Ribes analysis of the area worked intensively in 1927.

Type Division of Area Worked Extensively

Predicable Type	Acres	Per Cent
M-I Loture	32,340	35.24
M-I Cloture	4,380	3.97
M-I Loture	78,107	78.45
M-I Loture	714	0.82
Green Loture	1,253	1.12
Green Cloture	60	0.06
Green	4,721	4.36
Loam	1,327	1.72
Non-Green Type (I.I. and I.)	21,870	25.23
Total	113,812	100.00

Table No. 5 shows the acreage by predicable type of that area on which reconnaissance, both intensive and extensive, was performed in 1927.

Table No. 5

Type Division of Total Area Reconnaissanced

Predicable Type	Acres	Per Cent
M-I Loture	21,524	45.27
M-I Cloture	1,165	2.45
M-I Loture	14,339	30.17
M-I Cloture	1,324	2.78
Green Loture	1,324	2.78
Green Cloture	164	.05
Green	1,321	2.78
Loam	1,154	2.42
Non-Green Type (I.I. and I.)	1,870	1.96
Total	47,545	100.00

Table No. 6 gives an acreage and Biben analysis of the area worked intensively in 1927.

Table No. 6

Acreage and Ribes analysis of Area surveyed Intensively

Eradication Types	Acreage					Ribes per acre																				
						G. roezli					R. nevadense					R. sericeum					Totals				
	Nw-N.Fork Stanislaus River	E-N. Fork Stanislaus River	T2N R10E	Carl Inn	Total	Nw-N.Fork Stanislaus River	E-N.Fork Stanislaus River	T2N R10E	Carl Inn	Av-erage	Nw-N.Fork Stanislaus River	E-N.Fork Stanislaus River	T2N R10E	Carl Inn	Av-erage	Nw-N.Fork Stanislaus River	E.-N.Fork Stanislaus River	T2N R10E	Carl Inn	Aver-age	Nw-N.Fork Stanislaus River	E-N.Fork Stanislaus River	T2N R10E	Carl Inn	Av-erage
MP-M Nat.	18,846	8,119	1,023	10,664	42,652	13.91	14.34	26.83	8.02	13.92	0.09	0.42	0.66	1.36	0.64	---	---	0.10	--	0.01	14.00	14.77	26.69	9.38	14.47
MP-M Cult.	941	---	1,284	1,647	4,872	39.03	---	73.80	7.26	42.68	0.00	---	3.40	0.13	1.62	---	---	0.00	--	0.00	39.03	---	77.20	7.39	44.30
MP-F Nat.	2,798	8,092	4,429	2,008	23,402	22.60	26.69	66.98	65.66	35.91	0.46	2.70	2.19	2.19	1.79	---	---	0.18	--	0.03	22.96	29.39	68.76	67.74	37.73
MP-F Cult.	---	---	430	50	480	---	---	67.47	0.00	51.48	---	---	0.00	0.00	0.00	---	---	0.00	--	0.00	---	---	67.47	0.00	51.48
Mar. Nat.	427	286	103	205	1,100	57.64	68.80	76.42	46.60	61.60	51.76	34.05	61.56	44.96	46.20	---	---	0.00	--	0.00	109.42	102.85	141.98	91.56	107.80
Mar. Cult.	7	---	60	16	83	152.14	---	61.73	19.63	61.24	132.06	---	40.03	9.38	47.73	---	---	0.00	--	0.00	286.00	---	109.76	29.01	108.97
Brush	1,107	1,384	400	316	3,206	20.66	3.92	10.92	0.00	11.37	1.56	0.00	0.00	0.00	0.56	---	---	0.00	--	0.00	22.21	3.92	10.92	0.00	11.89
[illegible]	200	40	211	215	771	9.66	0.00	16.17	1.24	7.88	0.00	0.00	11.37	0.00	3.11	---	---	0.00	--	0.00	9.66	0.00	26.14	1.24	10.99
[illegible]	30,326	17,921	15,900	15,240	76,246	18.03	19.95	45.22	16.71	23.19	1.00	1.46	3.03	1.66	1.74	---	---	0.10	--	0.02	19.03	21.40	48.25	20.66	24.95

[illegible] Report

[illegible] Canyon

Table No. 7 gives an analysis of the time spent in training the field force for control reconnaissance for 1927.

Table No. 7

Training Time Analysis

Type of Training	No. Man Days	Per Cent
Reconnaissance	19½	43.33
Eradication	10	22.22
Sundays & Holidays	6	13.33
Travel	3	6.67
Supervision	6½	14.45
Totals	45	100.00

Table No. 8 gives an analysis of the time spent in the actual field work of control reconnaissance for 1927.

Table No. 8

Working Time Analysis

Type of Work	No. Man Days	Per Cent
Reconnaissance, Intensive	238	58.48
Reconnaissance, Extensive	25	6.14
Total Data Taking Work	263	64.62
Office	17	4.18
Making and Breaking Camp	22	5.41
Transportation, Supplies & Equipment	8	1.97
Travel	28½	7.00
Sundays and Holidays	58	14.24
Supervision	10½	2.58
Total Other Activities	144	35.38
Grand Total	407	100.00

Note: The field season started with the commencement of the training period on May 18th. Actual field work began on the 27th of May. A slight snowstorm was encountered during May, otherwise the weather was fine. Work was completed the 27th of August. It is felt that this period is much better for field work than that of last year, which was between the first of June and the middle of September, Ribes visibility being much higher.

Table No. 7 gives an analysis of the time spent in training the field force for control reconnaissance for 1927.

Table No. 7

Training Time Analysis

Type of Training	No. Man Days	Per Cent
Reconnaissance	191	43.33
Triangulation	10	22.72
Sundays & Holidays	6	13.63
Travel	3	6.87
Supervision	64	14.45
Totals	46	100.00

Table No. 8 gives an analysis of the time spent in the actual field work of control reconnaissance for 1927.

Table No. 8

Working Time Analysis

Type of Work	No. Man Days	Per Cent
Reconnaissance, Intensive	238	62.46
Reconnaissance, Extensive	25	6.14
Total Data Taking Work	263	68.60
Office	17	4.18
Meeting and Breaking Camp	22	5.41
Transportation, Supplies & Equipment	8	1.97
Travel	28½	7.00
Sundays and Holidays	58	14.24
Supervision	10½	3.58
Total Other Activities	144	35.38
Grand Total	407	100.00

Note: The field season started with the commencement of the training period on May 18th. Actual field work began on the 27th of May. A slight snowstorm was encountered during May, otherwise the weather was fine. Work was completed the 27th of August. It is felt that this period is much better for field work than that of last year, which was between the first of June and the middle of September, when visibility being much higher.

D. Costs.

Table No. 9 gives an analysis of the costs of the reconnaissance training period for 1927.

Table No. 9

Cost Reconnaissance Training Period

Classification	Cost	Per Cent
Salaries	$ 148.62	65.41
Subsistence	53.67	23.62
Travel	24.91	10.97
Totals	$ 227.20	100.00

Cost of Training Period per Man Day.

$$\frac{\text{Total Cost Training Period}}{\text{Number Man Days of Training Period}} = \frac{\$227.20}{45} = \$\ 5.05 \text{ per man day.}$$

Cost of Training Period per Man Trained.

$$\frac{\text{Total Cost Training Period}}{\text{Number Men Trained}} = \frac{\$227.20}{6^*} = \$37.87 \text{ per man trained.}$$

*One assistant stayed on the work for only half of the field season, thus necessitating the obtaining and training of another, which together with the time of the project leader, accounts for the number.

Table No. 10 gives an analysis of the costs of the actual field work on control reconnaissance performed in 1927.

D. Costs.

Table No. 9 gives an analysis of the costs of the reconnaissance training period for 1937.

Table No. 10

Control Reconnaissance Costs

Classification	Sub-total Cost	Sub-total Percent	Total Cost	Total Per Cent
Salaries			$ 1,362.78	58.40
*Subsistence				
Supplies	$ 418.86	76.64		
Transportation of supplies	106.64	19.52		
Cooking	21.00	3.84		
Totals	546.50	100.00	546.50	23.42
Travel				
Travel and scouting subsistence	151.29	65.13		
Transportation of men	43.69	18.82		
Scouting	37.25	16.05		
Totals	232.14	100.00	232.14	9.95
Equipment				
Proportional charge of equipment	77.88	40.43		
Transportation of equip. Spokane to Sonora	23.59	12.25		
Transportation of equipment Stanislaus Forest	90.86	47.29		
Totals	192.13	100.00	192.13	8.23
Grand Totals			$ 2,333.55	100.00

*Meal Cost Analysis

No. Meals Served	Total Cost per Meal	Cost Supplies per Meal	Cost Transporting Supplies per Meal	Cost Cooking per Meal
1212	$546.50 / 1212 = $.4509	$418.86 / 1212 = $.3456	$106.64 / 1212 = $.0880	$21.00 / 1212 = .0173

*A camp cook was found to be unnecessary, so was only kept a week.

Table No. 33

Distribution of persons aged 15 and over by number of hours they usually work a week

Number of hours usually worked a week	Total	Males	Females
1 - 14	1,515,000	1,515,000	1,515,000
15 - 29	1,515,000	1,515,000	1,515,000
30 - 39	1,515,000	1,515,000	1,515,000
40 - 49	1,515,000	1,515,000	1,515,000
50 -

Average Cost Per Man Day.

The total time charged to intensive reconnaissance was 368 days, or 90.50% of the total man days on the project; similarly, the time charged to extensive reconnaissance was 39 man days, or 9.50% of the total man days on the project.

These figures were derived as follows, for the purpose of allocating the "Total Other Activities" in the reconnaissance time analysis to the two divisions of "Data Taking Work."

238 Man Days, Intensive Reconnaissance / 263 Man Days, Data Taking Work = 90.50% of total data taking time devoted to intensive reconn.

90.50% times 407, the total man days on the project = 368 man days chargeable to intensive reconn.

In a similar manner the figures for extensive reconnaissance were obtained.

Cost charged to Intensive Reconn., $2,333.55 x 90.50% = $2,111.86
Cost charged to Extensive Reconn., $2,333.55 x 9.50% = $221.69

Cost per section, Intensive Reconnaissance,

Cost Intensive Reconnaissance $2111.86 / Sections Worked Intensively 118 = $17.90

Cost per section, Extensive Reconnaissance,

Cost Extensive Reconnaissance $221.69 / Sections Worked Extensively 176 = $ 1.26

Cost per section, of Total Sections Worked,

Total Cost of Control Reconnaissance $2333.55 / Total Sections Worked 294 = $ 7.94

Cost per acre, Intensive Reconnaissance,

Cost Intensive Reconnaissance $2111.86 / Acres Worked Intensively 76,346 = $ .0277

Cost per acre, Extensive Reconnaissance,

Cost Extensive Reconnaissance $221.69 / Acres Worked Extensively 110,606 = $ .0020

Cost per acre, Total Acres Worked

Total Cost Control Reconnaissance $2333.55 / Total Acres Worked 186,952 = $ .0125

The total time charged to intensive reconnaissance was 388 days, or 90.50% of the total man days on the project; similarly, the time charged to extensive reconnaissance was 39 man days, or 9.50% of the total man days on the project.

These figures were derived as follows, for the purpose of allocating the "Total Other Activities" in the reconnaissance time analysis to the two divisions of "Data Taking Work."

[illegible] Man Days, Intensive Reconnaissance = 90.50% of total data taking time
[illegible] Man Days, Data Taking were devoted to intensive recon

90.50% times 427, the total man days on the project = 388 man days charged to intensive reco

In a similar manner the figures for extensive reconnaissance were obtained.

Cost charged to Intensive Section, $[illegible] x 91.50% = $[illegible]
Cost charged to Extensive Section, $[illegible] x 8.50% = $[illegible]

Cost per section, Intensive Reconnaissance,

Cost Intensive Reconnaissance $[illegible] =
Sections Worked Intensively [illegible]

Cost per section, Extensive Reconnaissance,

Cost Extensive Reconnaissance $[illegible] =
Sections Worked Extensively [illegible]

Cost per section, of Total Reconnaissance,

Total Cost of Control Reconnaissance $[illegible] =
Total Sections Worked

Cost per acre, Intensive Reconnaissance

Cost Intensive Reconnaissance $[illegible] = $ .0377
Acres Worked Intensively [illegible]

Cost per acre, Extensive Reconnaissance,

Cost Extensive Reconnaissance $[illegible] = $ .0030
Acres Worked Extensively [illegible]

Cost per acre, Total Acres Worked

Total Cost Control Reconnaissance $[illegible] = $ .0150
Total Acres Worked [illegible]

Average Cost Per Man Day,

$$\frac{\text{Total Cost Control Reconnaissance } \$2333.55}{\text{Total Man Days } 407} = \$\ 5.73$$

Average Number Man Days per Section, Intensive

$$\frac{\text{Total Man Days Intensive Reconnaissance } 368}{\text{Sections Worked Intensively } 118} = 3.12 \text{ Man Days}$$

Average Number Man Days per Section, Extensive,

$$\frac{\text{Total Man Days Extensive Reconnaissance } 39}{\text{Sections Worked Extensively } 176} = 0.22 \text{ Man Days}$$

Average Number Man Days per Section on all Sections Worked

$$\frac{\text{Total Man Days on Control Reconnaissance } 407}{\text{Total Sections Worked } 294} = 1.38 \text{ Man Days}$$

IV. Collection of Data

All available data on the area worked during 1927 was obtained prior to the start of the field season. Forest Service records, both at the District Office in San Francisco, and at the Supervisor's headquarters in Sonora were gone over with the assistance of various Forest Service officials, the Forest Service giving at all times its fullest cooperation.

Especially helpful was a blue print drainage map of the Stanislaus Forest, obtained from the drafting department of the District Office, drawn on a scale of 2" to the mile. In many instances this map was of great value in locating section lines and corners where the original survey marks had been completely obliterated.

Average Cost per Man Day.

$$\frac{\text{Total Cost Control Organizations}}{\text{Total Man Days}} = \$\ 0.75$$

Average Number Man Days per Section, Intensive.

$$\frac{\text{Total Man Days Intensive Protection}}{\text{Sections served Intensively}} = 1.13 \text{ Man Days}$$

Average Number Man Days per Section, Extensive.

$$\frac{\text{Total Man Days Extensive Protection}}{\text{Sections served Extensively}} = 0.22 \text{ Man Days}$$

Average Number Man Days per Section on all Sections Served.

$$\frac{\text{Total Man Days on District Protection}}{\text{Total Sections Served}} = 1.35 \text{ Man Days}$$

IV. Collection of Data

All available data on the area worked during 1927 was obtained prior to the start of the field season. Forest Service records, both at the District Office in San Francisco, and at the Supervisor's headquarters in Sonora were gone over with the assistance of various Forest Service officials. The Forest Service giving at all times its fullest cooperation.

Recently surveyed are a blue print drainage map of the Stanislaus Forest, obtained from the Drafting department of the District Office, drawn on a scale of 2" to the mile. In many instances this map was of great value in locating section lines and corners where the original survey marks had been completely obliterated.

IX. EXPERIMENTAL RIBES ERADICATION STANISLAUS NATIONAL FOREST, CALIFORNIA

by

W. V. Benedict
Junior Forester

I. Introduction

The nearest known points of blister rust infection jeopardizing the California sugar pine stands are in northern Oregon along the lower Columbia River Basin. Why, then, an experimental project in controlling a disease as yet several hundred miles away?

In the first place, past experience in dealing with the disease has shown that its spread from an infection center is erratic. Infection has been known to occur on Ribes one hundred fifty miles from the nearest diseased pine and it is probable that a two-hundred mile jump, under favorable conditions, is not an impossibility. Several hundred miles, with white pines and highly susceptible Ribes all along the way, does not mean that the sugar pine is remote from danger.

In the second place, infection may readily become established in a pine stand a good many months before detection and be firmly entrenched by the time of discovery. Effective control measures could not then be applied. The experience with chestnut blight is a good example of what happens once a virulent disease gains a strong foothold.

In the third place, the fact that the rust is not already established in the region makes it possible to determine in advance, the cost of protecting the various sugar pine types, and to develop the most economical and efficient methods of protecting such types. Cost figures thus derived will be invaluable when the time comes to apply practical control measures, for blister rust control, like any other successful enterprise, must be economically feasible or it is destined to failure.

A. Purpose of Project

The purpose of the experimental eradication project was principally a further study in the development and perfection of efficient and economical methods of eradicating Ribes in the sugar pine forests. The immediate objects of the project were as follows:

1. Additional information on the conditions and problems affecting and influencing eradication.

IX. [illegible]

[illegible]

V

W. V. Benedict
Junior Forester

1. Introduction

The nearest known points of blister rust infection jeopardizing the California sugar pine stands are in northern Oregon along the lower Columbia River [illegible]. Why, then, an experimental project in controlling a disease as yet several hundred miles away?

In the first place, past experience in dealing with the disease has shown that its spread from an infection center is erratic. Infection has been known to occur on Ribes one hundred fifty miles from the nearest diseased pine and it is probable that a two-hundred mile jump, under favorable conditions, is not an impossibility. Several hundred miles, with white pines and highly susceptible Ribes all along the way, does not mean that the sugar pine is remote from danger.

In the second place, infection may readily become established in a pine stand a good many months before detection and be firmly entrenched by the time of discovery. Effective control measures could not then be applied. The experience with chestnut blight is a good example of what happens once a virulent disease gains a strong foothold.

In the third place, the fact that the rust is not already established in the region makes it possible to determine in advance, the cost of protecting the various sugar pine types, and to develop the most economical and efficient methods of protecting each type. Cost figures thus derived will be invaluable when the time comes to apply practical control measures, for blister rust control, like any other successful enterprise, must be economically feasible or it is destined to failure.

A. Purpose of Project

The purpose of the experimental eradication project was principally a further study in the development and perfection of efficient and economical methods of eradicating Ribes in the sugar pine forests. The immediate objects of the project were as follows:

1. Additional information on the conditions and problems affecting and influencing eradication.

2. A further development of the type of organization and methods of work best suited to local conditions, i.e. the crew formation best suited to the eradication of areas containing numerous Ribes; the development of a scouting organization of higher paid men to eradicate areas of few Ribes; the use of different types of tools in grubbing out bushes; the use of twine instead of paper in systematic crew eradication, etc.

3. To obtain detailed cost data, on the basis of acreage, for the different sugar pine types, both in mature timber and on various aged cut-over stands.

4. Training of additional personnel for future work.

II. Location of Work

The area upon which experimental eradication was carried on this year was adjacent to and adjoining the experimental area of last year. The area is located on the Stanislaus National Forest, in township 4 N, Range 18 E, Mt. Diablo Principal Meridian, along the South Fork of the Stanislaus River and Herring Creek. It extends from the township line on the west to Bumblebee Creek on the north and is drained by the above named streams and their smaller upper tributaries.

A. Reasons for selection of locality

The above described area was selected for the experimental eradication work for several reasons.

It was located within the optimum range of sugar pine. It contained extensive areas of mature timber and cut-over lands. Three separate timber sales were embodied within the area chosen, giving an opportunity for experimental work on various aged logging operations. Different methods of logging and different methods of brush disposal were practiced on the different timber sales which provided an opportunity to study Ribes recurrence on areas logged under different management practices.

This particular area is used by the Forest Service as an experimental area in the management of sugar pine and therefore is an area on which Ribes experiments should be undertaken in conjunction with the Forest Service experiments.

The eradication types were similar to those worked in 1926 thus giving a basis for comparing results with those of 1926.

B. Description of area

The area lies thirty miles above Sonora, California on the

2. A further development of the type of organisation and methods of work best suited to local conditions, i.e. the crew formation best suited to the eradication of areas containing numerous Ribes; the development of a recruiting organisation of higher paid men to eradicate areas of few Ribes; the use of different types of tools in grubbing out bushes; the use of twine instead of paper in systematic crew eradication, etc.

3. To obtain detailed cost data, on the basis of acreage, for the different sugar pine types, both in mature timber and on various aged cut-over stands.

4. Training of additional personnel for future work.

II. Location of Area

The area upon which experimental eradication was carried on this year was adjacent to and adjoining the experimental area of last year. The area is located on the Stanislaus National Forest, in township 4 N., Range 12 E., M.D. Field Principal Meridian, along the South Fork of the Stanislaus River and Herring Creek. It extends from the township line on the west to Twelvefoot Creek on the north and is drained by the above named streams and their smaller upper tributaries.

A. Reasons for selection of locality

The above described area was selected for the experimental eradication work for several reasons.

It was located within the optimum range of sugar pine. It contained extensive areas of mature timber and cut-over lands. There were merchantable timber sales worked within the area chosen, giving an opportunity for experimental work on various logging operations. Different methods of logging and different methods of brush disposal were practiced on the different timber sales which provided an opportunity to study Ribes reproduction on areas logged under different management practices.

This particular area is used by the Forest Service as an experimental area in the management of sugar pine and therefore is an area on which Ribes experiments should be undertaken in conjunction with the Forest Service experiments.

The eradication types were similar to those worked in 1928 thus giving a basis for comparing results with those of 1928.

B. Description of area

The area lies thirty miles above Sonora, California on the

lower west slopes of the Sierra Nevadas and is made readily accessible by a network of roads, trails and logging railroads. The topography is in general quite regular consisting of rolling hills cut by precipitous canyons. The area ranges from 5,000 feet to slightly over 6,000 feet in elevation. The soil is a mixture of old volcanic ash and decomposed granitic rock with many rock outcrops and surface boulders. There are early and late snows but long summers with little or no precipitation.

Sugar pine occurs generally over the entire area. On the warm sunny slopes (S and W) yellow pine and Jeffrey pine are its chief associates. Incense cedar and California Black Oak (Quercus californica) also occur in the type. The stand is characteristically open, being park-like in appearance. Brush, if not entirely lacking, is found only in occasional clumps or patches. The principal brush species occurring on the type are manzanita (Arctostaphylos patula Greene) spiny Ceanothus (Ceanothus cordulatus Kell) and scrubby chinquapin (Castanopsis sempervirens Dudley). Coniferous reproduction is generally sparse and scattered.

On the cooler moist slopes (N and E) sugar pine is found chiefly in association with white fir (Abies concolor). The same species of brush which occur on the south slopes grow on the north slopes, but in far greater concentrations. Spiny Ceanothus is the most abundant species of brush present.

Along the streams willow and alder appear in addition to the other species of brush mentioned above.

The cut-over lands represent areas which have been cut and logged under Forest Service supervision. Various ages of cutting are represented varying from a newly cut area to an old cut of ten years standing. Numerous seed trees and advance reproduction remains after logging. Brush is present in greater or less amounts on all logged areas, increasing directly with the age of the cut, being heavier on the north and east slopes. Coniferous reproduction, while present on all of the older logged areas, is rendered somewhat inconspicuous due to the presence of the bursh. Numerous patches of dense brush are entirely void of reproduction.

III. Organization of Project

The organization of the project was similar to that of previous years. A member of the permanent personnel of this office was in charge of the work and was responsible directly to the Spokane headquarters. Other members of the project were temporarily employed under letter of authorization with the exception of the scout who was under

lower west slopes of the Sierra Nevada, and is made readily accessible by a network of roads, trails, and logging railroads. The topography is in general quite regular consisting of rolling hills cut by precipitous canyons. The area ranges from 2,000 feet to slightly over 8,000 feet in elevation. The soil is a mixture of old volcanic ash and decomposed granitic rock with many rock outcrops and surface boulders. There are early and late snows but long summers with little or no precipitation.

Sugar pine occurs generally over the entire area. On the warm sunny slopes (S and W) yellow pine and Jeffrey pine are its chief associates. Incense cedar and California Black Oak (Quercus californica) also occur in the type. The stand is characteristically open, being park-like in appearance. Brush, if not entirely lacking, is found only in occasional clumps or patches. The principal brush species occurring on the type are Manzanita (Arctostaphylos patula), Ceanothus spiny Ceanothus, (Ceanothus cordulatus Kell), and scrubby chinquapin (Castanopsis sempervirens Hooker). Coniferous reproduction is generally sparse and scattered.

On the cooler moist slopes (N and E) sugar pine is found chiefly in association with white fir (Abies concolor). The same species of brush which occur on the south slopes occur on the north slopes, but in far greater concentrations. Spiny Ceanothus is the most abundant species of brush present.

Along the streams willow and alder occur in addition to the other species of brush mentioned above.

The cut-over lands represent areas which have been cut and logged under Forest Service supervision. Various ages of cutting are represented varying from a newly cut area to an old cut of ten years standing. Numerous seed trees and advance reproduction remains after logging. Brush is present in greater or less amounts on all logged areas, increasing directly with the age of the cut, being heavier on the north and east slopes. Coniferous reproduction, while present on all of the older logged areas, is rendered somewhat inconspicuous due to the presence of the brush. Numerous patches of dense brush are entirely void of reproduction.

III. Organization of Project

The organization of the project was similar to that of previous years. A member of the permanent personnel of this office was in charge of the work and was responsible directly to the Supervisor. Other members of the project were temporarily employed under letter of authorization with the exception of the scout who was under

temporary appointment. The personnel of the project was as follows:

Field Supervisor (in charge)	$175.00 per month
Scout	110.00 " "
4 Foremen (each in charge of a crew)	3.10 per day
16 Crewmen (laborers)	2.70 & 2.90 per day
Checker	3.10 per day
Cook	125.00 per month
Flunky	75.00 " "

The Field Supervisor was in direct charge of and responsible for the project. In addition to handling all records and reports it was his duty to direct his efforts towards increasing the efficiency and amount of work in every way possible, and to represent the organization in all business transactions and in cooperative dealings with other organizations.

The duties of the scout were to assume charge of the work during absences of the Field Supervisor, take charge of and direct the checking work and assist in the directing of scouting work.

Each foreman was responsible for the work of his crew of four men. He kept them in proper alignment, usually in an echelon formation, regulated the spacing between men, recorded all bushes eradicated and checked behind his men for bushes missed.

The crewmen's duties consisted of searching for and eradicating the Ribes bushes, under the direction of a foreman.

The checker, under the direction of and with the assistance of the scout, checked all eradicated areas for bushes missed, to determine the efficiency of the work. His additional duties included experimental work in perfecting methods of work.

The duties of cook and flunky are evident from their designations.

The scout, checker and foremen were men having had previous experience in Ribes eradication and possessing the desired qualities as leaders. The crew men were underclass men from the University of California and Sacramento Junior College.

The equipment for the project was supplied from the warehouse at Spokane, Washington. Commissary supplies were all purchased locally at Sonora, California. Staple groceries and fresh meats were bought under bid and all other requirements purchased at locally prevailing rates. Transportation needs were provided as the occasion demanded. Some freight was hauled with Forest Service truck, some by local transportation agencies and some by personally owned automobile operated at the rate of seven cents per mile.

temporary appointment. The personnel of the project was as follows:

Field Supervisor (in charge)	$175.00 per month
Scout	110.00 " "
4 Foremen (each in charge of a crew)	3.10 per day
16 Crewmen (laborers)	2.70 & 2.90 per day
Checker	3.10 per day
Cook	125.00 per month
Flunky	75.00 " "

The Field Supervisor was in direct charge of and responsible for the project. In addition to handling all records and reports it was his duty to direct his efforts towards increasing the efficiency and amount of work in every way possible, and to represent the organization in all business transactions and in cooperative dealings with other organizations.

The duties of the scout were to assume charge of the work during absences of the Field Supervisor, take charge of and direct the checking work and assist in the directing of sampling work.

Each foreman was responsible for the work of his crew of four men. He kept them in proper alignment, usually in an echelon formation, regulated the spacing between men, recorded all bushes eradicated and checked behind his men for bushes missed.

The crewmen's duties consisted of searching for and eradicating the Ribes bushes, under the direction of a foreman.

The checker, under the direction of and with the assistance of the scout, checked all eradicated areas for bushes missed, to determine the efficiency of the work. His additional duties included experimental work in perfecting methods of work.

The duties of cook and flunky are evident from their designations.

The scout, checker and foremen were men having had previous experience in Ribes eradication and possessing the desired qualities as leaders. The crew men were undergraduates from the University of California and Sacramento Junior College.

The equipment for the project was supplied from the warehouse at Spokane, Washington. Commissary supplies were all purchased locally at Sonora, California. Staple groceries and fresh meats were bought under bid and all other requirements purchased at locally prevailing rates. Transportation needs were provided as the occasion demanded. Some freight was hauled with Forest Service truck, some by local transportation agencies and some by personally owned automobile operated at the rate of seven cents per mile.

IV. Methods of Work

A. Pre-eradication data:

During the field season of 1926 the area was selected on which to continue in 1927 the experimental Ribes eradication work. The purpose of this advance work was to facilitate the work of the 1927 season by making available for field use all the information on the area necessary for planning and starting the operation. This preliminary work consisted of segregating the area into eradication types and working units or blocks. All of the blocks were definitely marked. A map of the area was constructed showing the location of the blocks in relation to the roads, trails, ridges and general drainage system. Data were recorded on each block giving the type, approximate acreage, general working conditions and relative Ribes population.

B. Classification of types:

Six different eradication types were represented on the area. They are named and described as follows:

1. Sugar pine-yellow pine mature:

The south facing slopes of mature sugar pine and yellow pine timber, characterized by open park-like stands, little or no brush and reproduction and very few Ribes. This type represents the easiest working conditions encountered.

2. Sugar pine-yellow pine cutover:

The cut-over areas of the south facing slopes. Brush in greater or less quantities depending upon the age of cutting, from a few scattered patches on newly cut areas to an almost complete covering on old logging areas. Ribes likewise varying in numbers from practically none on newly cut areas to large and numerous bushes on cuttings of long standing.

3. Sugar pine-fir mature:

The north facing slopes of sugar pine-fir timber. Because of the increased moisture present, timber, brush and Ribes are more numerous in this type.

IV. Methods of Work

A. Pre-reduction Data:

During the field season of 1926 the area was selected on which to continue in 1927 the experimental Ribes eradication work. The purpose of this advance work was to facilitate the work of the 1927 season by making available for field use all the information on the area necessary for planning and starting the operation. This preliminary work consisted of segregating the area into eradication types and working units or blocks. All of the blocks were definitely marked. A map of the area was constructed showing the location of the blocks in relation to the roads, trails, ridges and general drainage system. Data were recorded on each block giving the type, approximate acreage, general working conditions and relative Ribes population.

B. Classification of Types:

Six different eradication types were represented on the area. They are named and described as follows:

1. Open pine-yellow pine type:

The south facing slopes of mature sugar pine and yellow pine timber, characterized by open park-like stands. Little or no brush and reproduction and very few Ribes. This type proposes to offer the least working conditions encountered.

2. Open pine-yellow pine type:

The out-crop areas of the south facing slopes. Varied in greater or less quantities depending upon the age of cutting, from a few scattered patches on newly cut areas to an almost complete covering on old logging areas. Ribes likewise varying in numbers from practically none on newly cut areas to large and numerous bushes on cuttings of long standing.

3. Upper pine-fir type:

The north facing slopes of upper pine-fir timber. Because of the increased moisture present, brush and Ribes are more numerous in this type.



W. 245. Sugar pine-fir type.



W. 559. Typical sugar pine-yellow pine mature stand. Running about 15% sugar pine, 80% yellow and Jeffrey pine and 5% incense cedar and white fir. Ribes 2 per acre.

4. Sugar pine-fir cutover:

The cut-over areas of the north facing slopes. Brush and Ribes usually very dense, becoming increasingly so with the age of the cutting. In some places veritable thickets of brush and Ribes are to be found.

The above described eradication types are essentially the same as the Forest Service designation for the timber types in the locality bearing the same name.

5. Stream-mature:

Strips of varying width along the water courses in mature timber areas, representing openings in the stand, where, on account of the increased moisture available, brush and Ribes are generally present in greater numbers than in the surrounding territory.

6. Stream-cutover:

Strips of varying width along the water courses in cut-over areas. Brush and Ribes present in great profusion over entire type, becoming increasingly dense with age of cutting. This type represents hardest working conditions encountered.

C. Description of conditions encountered:

In the cut-over types, with the exception of the newly cut areas, the brush was much denser and Ribes thicker than in the similarly located mature timber areas. Ceanothus was the principal species of brush, with some manzanita and along streams willow and alder. The brush was generally denser and more prolific on the north and east exposures than on the south and west. Coniferous reproduction was generally present, but not in sufficient quantities to interfere with eradication. Unburned slashings and down logs increased the difficulty of eradication on the cut-over areas. The brush, in the order of occurrence on the area was Spiny Ceanothus (C. cordulatus) manzanita, mountain lilac (C. thyrsiflorus) chinquapin, wild cherry, willow and alder. It was densest on old cut-over stream types, with old cut-over sugar pine-fir, mature stream, old cut-over sugar pine-yellow pine, mature sugar pine-fir and mature sugar pine-yellow pine, following in the order given. The newly cut-over areas contained no more Ribes or brush than the mature areas of the same location.

In all types except the stream types the prickly fruited gooseberry (Grossularia roezli) was the principal species of Ribes. This Ribes was found in all types. The Sierra Nevada currant (Ribes nevadense) grew in great profusion along the water courses, being especially dense along side streams flowing down north and east slopes. Here it grew to almost tree-like proportions, often ten feet high with hundreds of feet of leaf-bearing stem. This Ribes was confined chiefly to streams, although

4. Sugar pine-fir cutover:

The cut-over areas of the north facing slopes. Brush and Ribes usually very dense, becoming increasingly so with the age of the cutting. In some places veritable thickets of brush and Ribes are to be found.

The above described stratification types are essentially the same as the Forest Service designation for the timber types in the locality bearing the same name.

5. Stream-mature:

Strips of varying width along the water courses in mature timber areas, representing openings in the stand, where, on account of the increased moisture available, brush and Ribes are generally present in greater numbers than in the surrounding territory.

6. Stream-cutover:

Strips of varying width along the water courses in cut-over areas. Brush and Ribes present in great profusion over entire type, becoming increasingly dense with age of cutting. This type represents hardest working conditions encountered.

C. Description of conditions encountered:

In the cut-over types, with the exception of the newly cut areas, the brush was much denser and Ribes thicker than in the similarly located mature timber areas. Ceanothus was the principal species of brush, with some manzanita and along streams willow and alder. The brush was generally denser and more prolific on the north and east exposures than on the south and west. Coniferous reproduction was generally present, but not in sufficient quantities to interfere with cradication. The burned clearings and down logs increased the difficulty of cradication on the cut-over areas. The brush, in the order of occurrence on the area where Ceanothus (C. cordulatus) manzanita, mountain lilac (C. thyrsiflorus chinquapin, wild cherry, willow and alder. It was densest on old cut-over stream types, with old cut-over sugar pine-fir, mature stream, old cut-over sugar pine-yellow pine, mature sugar pine-fir and mature sugar pine-yellow pine, following in the order given. The newly cut-over areas contained no more Ribes or brush than the mature areas of the same location.

In all types except the stream types the prickly fruited gooseberry (Grossularia roezli) was the principal species of Ribes. This Ribes was found in all types. The Sierra Nevada currant (Ribes nevadense) grew in great profusion along the water courses, being especially dense along side streams flowing down north and east slopes. Here it grew to almost tree-like proportions, often ten feet high with branches of feet of leaf-bearing stem. This Ribes was confined chiefly to streams, although



W. 526. Sugar pine-yellow pine new cut-over area.



W. 550. Sugar pine-fir. Old cut-over area. Note large R. nevadense in foreground.

occurring sparingly on north and east slopes.

The Ribes species growing in this locality were all deep-rooted, tenacious plants requiring the use of a heavy grubbing tool for their eradication. The dryness of the ground and the great number of surface boulders, together with the large size of the Ribes, made the actual extraction of the plant a more difficult task than it had been in other localities. G. roezli was by far the most important species of the locality numbering 78% of the total bushes destroyed.

At the first of the season it was easy to see the Ribes, but as the season progressed they blended in with other plants, which made it harder to find them. In many instances Ribes were so closely associated with Ceanothus and manzanita brush that in order to eradicate the Ribes it was necessary to grub out the surrounding brush. Often the Ribes bushes (particularly R. nevadense) grew from cracks in large granite boulders. This made eradication exceedingly difficult.

No attempt was made to eradicate the many thousands of Ribes seedlings of both species occurring over much of the area.

D. Methods Used

In general, the methods of Ribes eradication used were similar to those of the 1926 season. On all intensive eradication areas, that is, such areas containing numerous Ribes and such working conditions as to require close crew work, the regular 5-man or 4-man crew, with a foreman checking behind was used. On the extensive eradication areas, or areas containing few Ribes and working conditions permitting wide spacing of men, special scout crews were used. The scout crew consisted of three or four men, especially selected for the work. These men worked at wide intervals, without a man checking behind, covering considerable acreage per day.

In both types of crew formation each man in the crew was equipped with an eradication tool. Several types of tools were in use. Crews working in stream types of cut-over areas where Ribes and brush were thick used grub-hoes and mattocks. These heavy tools were necessary to get out the large bushes growing in this region. Often it was necessary to use an axe to cut away the brush and tops of the Ribes before the crown could be reached. Picks were necessary in rocky regions. The members of the scout crews carried an improvised Ribes tool somewhat lighter than the grub-hoe with a pick on one end. All of the root-system possible was removed. Root and crown studies indicate that so long as all of the crown is removed there will be no regrowth. However, because of the difficulty the average crew man experiences in differentiating between the crown and remaining root system, all of the roots possible were taken out. For a short time in the early part of the season on the moist slopes many of the smaller bushes could be eradicated by hand pulling.

occurring sparingly on north and east slopes.

The Ribes species growing in this locality were all deep-rooted, tenacious plants requiring the use of a heavy grubbing tool for their eradication. The dryness of the ground and the great number of surface boulders, together with the large size of the Ribes, made the actual extraction of the plant a more difficult task than it had been in other localities. *O. rosell* was by far the most important species of the locality numbering 78% of the total bushes destroyed.

At the first of the season it was easy to see the Ribes, but as the season progressed they blended in with other plants, which made it harder to find them. In many instances Ribes were so closely associated with Ceanothus and manzanita brush that in order to eradicate the Ribes it was necessary to grub out the surrounding brush. Often the Ribes bushes (particularly *R. nevadense*) grew from cracks in large granite boulders. This made eradication exceedingly difficult.

No attempt was made to eradicate the many thousands of Ribes seedlings of both species occurring over much of the area.

D. Methods Used

In general, the methods of Ribes eradication used were similar to those of the 1936 season. On all intensive eradication areas, that is, such areas containing numerous Ribes and such working conditions as to require close crew work, the regular 5-man or 4-man crew, with a foreman checking behind was used. On the extensive eradication areas, or areas containing few Ribes and working conditions permitting wide spacing of men, special scout crews were used. The scout crew consisted of three or four men, especially selected for the work. These men worked at wide intervals, without a man checking behind, covering considerable acreage per day.

In both types of crew formation each man in the crew was equipped with an eradication tool. Several types of tools were in use. Crews working in stream types of cut-over areas where Ribes and brush were thick used grub-hoes and mattocks. These heavy tools were necessary to get out the large bushes growing in this region. Often it was necessary to use an axe to cut away the brush and tops of the Ribes before the crown could be reached. Picks were necessary in rocky regions. The members of the scout crews carried an improvised Ribes tool somewhat lighter than the grub-hoe with a pick on one end. All of the root-system possible was removed. Root and crown studies indicate that so long as all of the crown is removed there will be no regrowth. However, because of the difficulty the average crew man experiences in differentiating between the crown and remaining root system, all of the roots possible were taken out. For a short time in the early part of the season on the moist slopes many of the smaller bushes could be eradicated by hand pulling.



W. 539. Swamp of R. nevadense in willow, aspen.



W. 551. Stream type, cut-over.

The ordinary two-pound spindle of 3-ply grocer's twine was largely used as guide trail. Various methods of carrying devices to unravel the twine were tried out but the method finally adopted as best suited to conditions was simply for the man laying trail to jam the twine on the end of his eradication tool, letting the string unravel as the crew progressed. Men were kept uniformly spaced and in as straight lines as possible, the man unraveling string guiding by the string line of the previous trip. Numerous cattle pasturing in the mountains of the locality caused some delay be breaking out string lines. On a few areas paper squares had to be used in place of string for a guide trail. The scout crews, when working in open areas with few Ribes used a box compass to guide them across a strip. On the less open areas they used twine and occasionally paper squares.

On areas requiring intensive crew formation four or five men, in echelon formation, at from 8 to 30 feet spacing between men, covered the block. Most of the time was spent in actually grubbing out bushes. A foreman was kept busy behind the line checking missed bushes and keeping the men in proper alignment. The scout crews worked somewhat differently Three and four men made up a scout crew. They stripped an area systematically with a wide interval between men, from 40 to 130 feet depending upon the visibility of the country. Each man covered a zigzag course between his neighbors, searching for possible Ribes patches. Most of the time was spent in searching for bushes. Progress was rapid. No foreman checked behind the men, the center man in line being in charge of the crew.

E. Best methods

Because of the variation in topography and physical conditions of the country there is no one formation best suited to all types. Usually a larger sized crew can be employed on areas of dense Ribes. The general trend this season was to reduce the size of the crews. The best formation for intensive work proved to be a four-man crew with foreman checking behind. The three-man scout crew proved the most satisfactory on areas of few Ribes. A larger crew runs into difficulty in keeping formation, and a lowered efficiency results.

V. Results of Work

A total area of 3,536.4 acres, averaging 59.68 Ribes per acre, was eradicated. The following tabulation shows by the several eradication types, the total results of the season's work:

The ordinary two-pound spindle of 3-ply grocer's twine was largely used as guide trail. Various methods of carrying devices to unravel the twine were tried out but the method finally adopted as best suited to conditions was simply for the man laying trail to jam the twine on the end of his eradication tool, letting the string unravel as the crew progressed. Men were kept uniformly spaced and in as straight lines as possible, the man unravelling string guiding by the string line of the previous trip. Numerous cattle pasturing in the mountains of the locality caused some delay be breaking out string lines. On a few areas paper squares had to be used in place of string for a guide trail. The scout crews, when working in open areas with few Ribes used a box compass to guide them across a strip. On the less open areas they used twine and occasionally paper squares.

On areas requiring intensive crew formation four or five men, in echelon formation, at from 8 to 30 feet spacing between men, covered the block. Most of the time was spent in actually grubbing out bushes. A foreman was kept busy behind the line checking missed bushes and keeping the men in proper alignment. The scout crews worked somewhat differently with a wide interval between men, from 40 to 130 feet depending upon the visibility of the country. Each man covered a zigzag course between his neighbors, searching for possible Ribes bushes. Most of the time was spent in searching for bushes. Progress was rapid. No foreman checked behind the men, the center man in line being in charge of the crew.

E. Best methods

Because of the variation in topography and physical conditions of the country there is no one formation best suited to all types. Usually a larger sized crew can be employed on areas of dense Ribes. The general trend this season was to reduce the size of the crews. The best formation for intensive work proved to be a four-man crew with foreman checking behind. The three-man scout crew proved the most satisfactory on areas of few Ribes. A larger crew runs into difficulty in keeping formation, and a lowered efficiency results.

V. Results of Work

A total area of 3,338.4 acres, averaging 39.6E Ribes per acre, was eradicated. The following tabulation shows by the several eradication types, the total results of the season's work:

TABLE NO. 1

Summary of Eradication by Type.

Eradication Type	Type Area	Ribes per Acre	Ribes Eradicated			Time Spent on Eradication				Acres per Man Day	Ribes per Man Day	Percentage of Total		
			G. roezli	R. nevad.	Total	Crewman Days	Foreman Days	Scout Days	Total Days			Acreage	Working Time	Ribes
S.P.-Y.P. Mature	990.4	6.7	6,264	401	6,665	28.0	7.0	46.5	81.5	12.15	81.78	28.01	6.85	3.16
S.P.-Y.P. Cut-over	1,133.3	30.8	34,059	936	34,995	37.7	9.0	125.93	172.63	6.56	202.72	32.05	14.52	16.59
S.P.-Fir Mature	353.9	38.1	12,036	1,445	13,481	89.5	21.12	3.0	113.62	3.1	118.65	10.01	9.55	6.39
S.P.-Fir Cut-over	908.5	111.4	94,524	6,768	101,292	431.42	106.0	58.0	595.42	1.52	170.12	25.69	50.07	47.98
Stream Mature	74.6	80.3	2,121	3,871	5,992	31.5	7.87	10.37	49.74	1.499	120.47	2.11	4.18	2.84
Stream Cut-over	75.7	642.2	16,220	32,395	48,615	120.81	33.13	22.37	176.31	0.43	275.73	2.13	14.83	23.04
Totals	3,536.4	59.68	165,224	45,816	211,040	738.93	184.12	266.17	1,189.22	2.97	177.46	100.00	100.00	100.00

TABLE NO. 1

Summary of Estimate by Items

Description of Item	Unit	Quantity	Rate	Amount	Percentage of Total Amount
Earthwork in excavation in foundation trenches	Cu.m.	1,250.00	12.50	15,625.00	3.42
Earthwork in excavation in basement	Cu.m.	800.00	15.00	12,000.00	2.63
Earthwork in excavation in plinth	Cu.m.	450.00	12.50	5,625.00	1.23
Earthwork in excavation in trenches for pipes	Cu.m.	2,100.00	8.00	16,800.00	3.68
Earthwork in excavation in trenches for cables	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for drains	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for sewers	Cu.m.	2,400.00	8.00	19,200.00	4.20
Earthwork in excavation in trenches for water mains	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for gas mains	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for telephone cables	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for electric cables	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for fire mains	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	3,000.00	8.00	24,000.00	5.25
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,500.00	8.00	20,000.00	4.38
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	2,200.00	8.00	17,600.00	3.85
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for combined drainage	Cu.m.	2,000.00	8.00	16,000.00	3.50
Earthwork in excavation in trenches for storm water drains	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for water supply pipes	Cu.m.	2,300.00	8.00	18,400.00	4.03
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for telephone cables	Cu.m.	350.00	8.00	2,800.00	0.61
Earthwork in excavation in trenches for electric cables	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for fire mains	Cu.m.	850.00	8.00	6,800.00	1.49
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,800.00	8.00	22,400.00	4.90
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,400.00	8.00	19,200.00	4.20
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	2,100.00	8.00	16,800.00	3.68
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,900.00	8.00	15,200.00	3.33
Earthwork in excavation in trenches for storm water drains	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for water supply pipes	Cu.m.	2,200.00	8.00	17,600.00	3.85
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for telephone cables	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for electric cables	Cu.m.	850.00	8.00	6,800.00	1.49
Earthwork in excavation in trenches for fire mains	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,700.00	8.00	21,600.00	4.73
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,300.00	8.00	18,400.00	4.03
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	2,000.00	8.00	16,000.00	3.50
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for storm water drains	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for water supply pipes	Cu.m.	2,100.00	8.00	16,800.00	3.68
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for telephone cables	Cu.m.	250.00	8.00	2,000.00	0.44
Earthwork in excavation in trenches for electric cables	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for fire mains	Cu.m.	750.00	8.00	6,000.00	1.31
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,600.00	8.00	20,800.00	4.55
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,200.00	8.00	17,600.00	3.85
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,900.00	8.00	15,200.00	3.33
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for storm water drains	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for water supply pipes	Cu.m.	2,000.00	8.00	16,000.00	3.50
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for telephone cables	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for electric cables	Cu.m.	750.00	8.00	6,000.00	1.31
Earthwork in excavation in trenches for fire mains	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,500.00	8.00	20,000.00	4.38
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,100.00	8.00	16,800.00	3.68
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for storm water drains	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,900.00	8.00	15,200.00	3.33
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for telephone cables	Cu.m.	150.00	8.00	1,200.00	0.26
Earthwork in excavation in trenches for electric cables	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for fire mains	Cu.m.	650.00	8.00	5,200.00	1.14
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,400.00	8.00	19,200.00	4.20
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	2,000.00	8.00	16,000.00	3.50
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for storm water drains	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for telephone cables	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for electric cables	Cu.m.	650.00	8.00	5,200.00	1.14
Earthwork in excavation in trenches for fire mains	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,300.00	8.00	18,400.00	4.03
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,900.00	8.00	15,200.00	3.33
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for surface drainage	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for storm water drains	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for telephone cables	Cu.m.	50.00	8.00	400.00	0.09
Earthwork in excavation in trenches for electric cables	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for fire mains	Cu.m.	550.00	8.00	4,400.00	0.96
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,200.00	8.00	17,600.00	3.85
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for surface drainage	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for storm water drains	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for sewage pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	550.00	8.00	4,400.00	0.96
Earthwork in excavation in trenches for fire mains	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,100.00	8.00	16,800.00	3.68
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for surface drainage	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for storm water drains	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for sewage pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for fire mains	Cu.m.	450.00	8.00	3,600.00	0.79
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	2,000.00	8.00	16,000.00	3.50
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for surface drainage	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for storm water drains	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for sewage pipes	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	450.00	8.00	3,600.00	0.79
Earthwork in excavation in trenches for fire mains	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,900.00	8.00	15,200.00	3.33
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for surface drainage	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for combined drainage	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for storm water drains	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for sewage pipes	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for fire mains	Cu.m.	350.00	8.00	2,800.00	0.61
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,800.00	8.00	14,400.00	3.15
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for surface drainage	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for combined drainage	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for storm water drains	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for sewage pipes	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	350.00	8.00	2,800.00	0.61
Earthwork in excavation in trenches for fire mains	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,700.00	8.00	13,600.00	2.98
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for surface drainage	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for combined drainage	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for storm water drains	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for sewage pipes	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for fire mains	Cu.m.	250.00	8.00	2,000.00	0.44
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,600.00	8.00	12,800.00	2.80
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for surface drainage	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for combined drainage	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for storm water drains	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for sewage pipes	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for water supply pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	250.00	8.00	2,000.00	0.44
Earthwork in excavation in trenches for fire mains	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,500.00	8.00	12,000.00	2.63
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for surface drainage	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for combined drainage	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for water supply pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for fire mains	Cu.m.	150.00	8.00	1,200.00	0.26
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,400.00	8.00	11,200.00	2.45
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for surface drainage	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for combined drainage	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for water supply pipes	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	150.00	8.00	1,200.00	0.26
Earthwork in excavation in trenches for fire mains	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,300.00	8.00	10,400.00	2.28
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for surface drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for combined drainage	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for water supply pipes	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for fire mains	Cu.m.	50.00	8.00	400.00	0.09
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,200.00	8.00	9,600.00	2.10
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	800.00	8.00	6,400.00	1.40
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for surface drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for combined drainage	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for water supply pipes	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	50.00	8.00	400.00	0.09
Earthwork in excavation in trenches for fire mains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,100.00	8.00	8,800.00	1.93
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	700.00	8.00	5,600.00	1.23
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for surface drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for combined drainage	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for water supply pipes	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for fire mains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	1,000.00	8.00	8,000.00	1.75
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	600.00	8.00	4,800.00	1.05
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for surface drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for combined drainage	Cu.m.	100.00	8.00	800.00	0.18
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for water supply pipes	Cu.m.	400.00	8.00	3,200.00	0.70
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for fire mains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for irrigation pipes	Cu.m.	900.00	8.00	7,200.00	1.58
Earthwork in excavation in trenches for sprinkler pipes	Cu.m.	500.00	8.00	4,000.00	0.88
Earthwork in excavation in trenches for drip irrigation pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for subsoil drainage	Cu.m.	200.00	8.00	1,600.00	0.35
Earthwork in excavation in trenches for surface drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for combined drainage	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for storm water drains	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for sewage pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for water supply pipes	Cu.m.	300.00	8.00	2,400.00	0.53
Earthwork in excavation in trenches for gas supply pipes	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for telephone cables	Cu.m.	0.00	8.00	0.00	0.00
Earthwork in excavation in trenches for electric



W. 586-A. Regular crew formation in cut-over sugar pine-fir type. Note large Ribes in foreground. Difficult job.



W. 557. Regrowth from improperly eradicated G. roezli.

It will be noted in the above tabulation that no differentiation is shown as to the various ages of cuttings on each of the three cut-over types. All ages of cuttings represented on the eradication type were grouped, and designated as a S.P.-Y.P. cut-over or S.P.-Fir cut-over, whichever the case might be. The number of Ribes on an area and the amount of brush on an area vary directly with the age of the cutting. Thus a newly cut area and an eight-year cut-over area of the same timber type, would not be comparable as to working conditions, number of Ribes, or cost. The following table shows the variation in conditions on the several ages of cuttings represented on each of the eradication types:

It will be noted in the above tabulation that no differentiation is shown as to the various ages of cuttings on each of the three cut-over types. All ages of cuttings represented on the eradication type were grouped, and designated as a S.P.-Y.P. cut-over or S.P.-Fir cut-over, whichever the case might be. The number of Hikes on an area and the amount of brush on an area vary directly with the age of the cutting. Thus a newly cut area and an eight-year cut-over area of the same timber type, would not be comparable as to working conditions, number of Hikes, or cost. The following table shows the variation in conditions on the several ages of cuttings represented on each of the eradication types:

TABLE NO. 2

Effect of Logging Upon Eradication

Eradication Type	Type Area	Ribes per Acre	Ribes Eradicated			Time Spent on Eradication				Acres per Man Day	Ribes per Man Day	Percentages of Total		
			G. roezli	R. nevad.	Total	Crewmen Days	Foreman Days	Scout Days	Total			Acreage	Working Time	Ribes
S.P.-Y.P.Mat.	990.4	6.7	6,264	401	6,665	28.0	7.0	46.50	81.50	12.15	81.78	28.01	6.85	3.16
SP-YP Cutover 1 - 2 yrs.	758.1	4.19	2,491	687	3,178	0	0	56.93	56.93	13.32	55.82	21.44	4.79	1.51
SP-YP Cutover 3 - 4 yrs.	235.0	41.1	9,654	5	9,659	0	0	45.0	45.0	5.2	214.6	6.65	3.78	4.58
SP-YP Cutover 7 - 8 yrs.	140.2	159.0	21,914	244	22,158	37.7	9.0	24.0	70.7	1.9	313.4	3.96	5.95	10.50
SP-Fir Mat.	353.9	38.09	12,036	1,445	13,481	89.5	21.12	3.0	113.62	3.1	118.65	10.01	9.55	6.39
SP-Fir Cutover 1 - 2 yrs.	71.0	58.5	4,155	1	4,156	0	0	10.25	10.25	6.9	405.4	2.01	0.86	1.96
SP-Fir Cutover 3 - 4 yrs.	637.4	113.42	68,794	3,502	72,296	346.02	85.0	24.75	455.77	1.4	158.62	18.02	38.33	34.25
SP-Fir Cutover 7 - 8 yrs.	200.1	124.3	21,575	3,265	24,840	85.4	21.0	23.0	129.4	1.5	191.9	5.66	10.88	11.77
Stream-Mature	74.6	80.3	2,121	3,871	5,992	31.5	7.87	10.37	49.74	1.5	120.47	2.11	4.18	2.84
Stream-cutover 1 - 2 yrs.	49.0	261.69	3,312	9,511	12,823	20.0	5.0	22.37	47.37	1.03	270.70	1.38	3.99	6.08
Stream-cutover 7 - 8 yrs.	26.7	1340.53	13,908	22,884	35,792	100.81	28.13	0	128.94	0.31	277.59	0.75	10.84	16.96
Totals	3,536.4	59.68	165,824	45,816	211,040	738.93	184.12	266.17	1,189.22	2.97	177.46	100.00	100.00	100.00

TABLE NO. 2

Effect of Logging Upon Eradication

Eradication Type	Area Type	Ribes per Acre	Ribes Predicted S. reproll	Ribes Predicted R. reprod.	Ribes Predicted Total	Time Spent on Eradication Crewmen Days	Time Spent on Eradication Foreman Days	Time Spent on Eradication Total	Acres per Man Day	Miles per Man Day	Percentage of Total Time Per-tag Acre	Percentage of Total Time Acre-ing Time
[illegible]	590.4	5.7	6,[illegible]	401	6,828	28.0	7.0	46.80	[illegible]	82.72	12.12	76.01
SP-IP Cutover 1 - 2 yrs.	758.1	4.15	2,491	682	3,176	0	0	56.92	13.45	55.8	27.44	4.72
SP-IP Cutover 3 - 4 yrs.	238.0	41.1	9,654	5	9,659	0	0	45.0	5.3	214.8	6.65	2.74
SP-IP Cutover 7 - 8 yrs.	140.2	159.0	21,914	244	22,158	37.7	8.0	24.0	1.5	213.4	7.96	5.94
SP-PIP Mat.	765.5	18,045	1,445	12,491	59.5	21.12	3.0	113.82	2.1	118.85	10.01	4.52
SP-PIP Cutover 1 - 2 yrs.	72.0	58.5	4,155	1	4,156	0	0	10.25	6.9	426.4	2.01	0.52
SP-PIP Cutover 3 - 4 yrs.	827.4	114.42	65,794	3,808	72,258	346.02	85.0	24.72	1.4	126.60	16.08	24.23
SP-PIP Cutover 7 - 8 yrs.	200.1	124.3	21,575	3,268	24,840	85.4	21.0	23.0	1.5	113.9	9.56	10.82
Stream-Mature	74.6	80.3	2,121	3,471	5,592	31.5	7.67	10.37	1.6	120.47	2.11	4.18
Stream-cutover 1 - 2 yrs.	46.0	261.69	3,812	9,511	13,825	20.0	5.0	22.37	1.07	120.70	1.38	3.54
Stream-cutover 7 - 8 yrs.	26.7	1,140.85	12,908	22,884	35,792	100.81	26.13	0	1.23.94	0.21	272.89	0.75	10.84
Totals	[illegible]	59.65	185,284	46,816	231,040	772.92	184.13	366.17	1,189.22	8.97	1772.46	100.00	100.00

The above table clearly shows the invasion or establishment of Ribes upon an area following logging. With one exception, which is on the sugar pine-yellow pine cut-over, 1 - 2 year type there is a direct increase in Ribes population on an area from the time of cutting up to and including eight years after cutting. Experimental work on older cuttings is necessary to complete the data.

The probable explanation of the decrease in number of Ribes on areas of 1 - 2 years age cutting on sugar pine-yellow pine type is that on such areas Ribes in the uncut stands are found chiefly along intermittent stream bottoms. These small draws form natural skid-ways and during the logging operation logs are pulled through these draws. This practice tears out many of the Ribes and because of the dryness of the site, they have not had sufficient time to re-establish themselves. The next two years after logging on the same site shows a big increase in Ribes.

On the sugar pine-fir types while there are more Ribes along the draws and intermittent streams, there is a general scattering of Ribes over the entire area. This condition combined with the additional moisture present on these types results in an increase in Ribes population almost immediately after logging.

The preceding tables summarize the work done by eradication types. Within each type there is considerable variation in cost of eradication because of differences in brush density as well as differences in the number of Ribes per acre. In Table No. 3 the block or working unit is used as a basis for computations. This gives an idea of the variations in working conditions within a type. Each block contains but one eradication type.

The above table clearly shows the invasion or establishment of Ribes upon an area following logging. With one exception, which is on the sugar pine-yellow pine cut-over, 1 - 5 year type there is a direct increase in Ribes population as an area from the time of cutting up to and including eight years after cutting. Experimental work on other cuttings is necessary to complete the data.

The probable explanation of the decrease in number of Ribes on areas of 1 - 5 years cut cutting on sugar pine-yellow pine type is that on such areas Ribes in the uncut stands are found chiefly along intermittent stream borders. These small draws form natural skid-ways and during the logging operation logs are pulled through these draws. This practice tears out many of the Ribes and because of the dryness of the site, they have not had sufficient time to re-establish themselves. The next two years after logging on the same site shows a big increase in Ribes.

On the sugar pine-fir types while there are more Ribes along the draws and intermittent streams, there is a general scattering of Ribes over the entire area. This condition combined with the additional moisture present on these types results in an increase in Ribes population almost immediately after logging.

The preceding tables summarize the work done by eradication types. Within each type there is considerable variation in cost of eradication because of differences in brush density as well as differences in the number of Ribes per acre. In Table No. 3 the block of working unit is used as a basis for computations. This gives an idea of the variations in working conditions within a type. Each block contains but one eradication type.

TABLE NO. 3

Summary of Eradication by Block

Block No.	Type	Acres	Total Ribes	Ribes per Acre	Cost per Acre	Cost per Bush
35 - A	SP - YP Mature	143.9	155	1.07	$ 0.26	$0.24
7-8	"	782.6	6,383	8.2	0.55	0.068
28	"	63.9	127	2.0	0.22	0.109
35 - B	SP - YP Cutover					
	1 - 2 yrs.	195.9	319	1.62	$ 0.31	$0.193
27	"	113.1	567	5.01	0.27	0.054
19	"	449.1	2,292	5.07	0.56	0.109
26	SP - YP Cutover					
	3 - 4 yrs.	235.0	9,659	41.1	$ 1.15	$0.028
5	SP - YP Cutover					
	7 - 8 yrs.	140.2	22,158	159.0	$ 3.00	$0.019
4	SP-Fir Mature	50.1	5,831	116.6	$ 3.26	$0.028
37	"	185.0	3,249	17.5	1.59	0.091
3 - A	"	118.8	4,401	37.0	1.79	0.048
33	SP - Fir Cutover					
	1 - 2 yrs.	71.0	4,156	58.5	$ 0.87	$0.015
9 - 10	SP - Fir Cutover					
	3 - 4 yrs.	547.3	60,337	110.24	$ 4.65	$0.042
32	"	90.1	11,959	132.7	1.65	0.012
1	SP - Fir Cutover					
	7 - 8 yrs.	200.1	24,840	124.3	$ 3.83	0.031
38	Stream Mature	39.6	2,858	72.2	$ 4.05	$0.056
3 - B	"	35.0	3,134	89.6	3.85	0.043
16	Stream Cutover					
	1 - 2 yrs.	32.5	2,516	77.43	$ 7.20	$0.093
25	"	16.5	10,307	624.7	2.92	0.004
6	Stream Cutover					
	7 - 8 yrs.	11.5	7,618	662.4	$23.38	$0.036
2	"	15.2	28,174	1,853.4	32.11	0.017
	Total	3,536.4	211,040	59.68	$ 2.00	$0.034

Block No.	Type	Acres	Total Timber	Ribbs per Acre	Cost per Acre
25 - A	Mr - Tr Clearcut	142.9	1cm	3.07	$ 0.38
7-9	"	752.6	6,135	8.2	0.64
58	"	64.9	317	4.8	0.79
33 - B	Br - Tr Cedarcut				
	1 - 2 yrs.	128.8	819	1.62	$ 0.22
27	"	132.1	897	6.72	0.27
11	"	442.1	2,289	5.27	0.35
45	Br - Tr Cedarcut				
	3 - 4 yrs.	178.0	3,650	41.1	$ 1.15
6	Br - Tr Cedarcut				
	7 - 8 yrs.	142.3	32,167	1cm.0	$ 0.20
4	Br-Tir Mixture	90.1	8,823	116.8	$ 0.35
37	"	134.0	2,340	17.8	1.80
2 - A	"	128.8	4,401	32.6	1.72
33	Br - Tir Cedarcut				
	5 - 6 yrs.	72.0	4,173	80.8	$ 0.87
2 - 30	Br - Tir Cedarcut				
	3 - 4 yrs.	542.3	20,327	170.78	$ 4.65
42	"	20.1	11,128	134.7	1.68
1	Br - Tir Cedarcut				
	7 - 8 yrs.	200.1	24,840	184.3	$ 1.80
26	Tirrem Mixture	32.6	2,854	78.2	$ 4.06
8 - B	"	28.0	3,134	82.8	3.32
10	Tirrem Cedarcut				
	1 - 2 yrs.	34.1	2,812	72.40	$ 2.20
25	"	18.1	10,327	614.7	2.42
5	Tirrem Cedarcut				
	7 - 8 yrs.	11.8	7,818	602.4	$ 24.82
2	"	18.8	22,174	1,202.4	21.11
	Total	3,772.4	227,040	72.82	$ 2.02

TABLE NO. 4

Cost of Eradication by Type

Variation in Cost per Acre and Cost per Bush

Eradication Type	Acres	Ribes per Acre	Time to Eradicate				Total Cost	Cost per Acre	Cost per Ribes Pulled	Percentages of Total			
			Crew-man Days	Fore-man Days	Scout Days	Total				Acres	Ribes	Work-ing Time	Cost
SP-YP Mat.	990.4	6.7	28.0	7.0	46.5	51.5	$ 487.07	$ 0.49	$0.073	28.01	3.16	6.85	6.90
SP-YP Cut.	1,133.3	30.8	37.7	9.0	125.93	172.63	1,034.88	0.91	0.029	32.05	16.59	14.52	14.66
SP-Fir Mat.	353.9	38.1	89.5	21.12	3.0	113.62	671.23	1.89	0.049	10.01	6.39	9.55	9.51
SP-Fir Cut.	908.5	111.4	431.42	106.0	58.0	595.42	3,523.44	3.88	0.034	25.69	47.93	50.07	49.93
Stream Mat.	74.6	80.3	31.5	7.87	10.37	49.74	295.40	3.96	0.049	2.11	2.84	4.18	4.19
Stream Cut.	75.7	642.2	120.81	33.13	22.37	176.31	1,045.16	13.81	0.021	2.13	23.04	14.83	14.81
Totals	3,536.4	59.83	738.93	184.12	266.17	1,189.22	$7,057.18	$ 2.00	$0.034	100.00	100.00	100.00	100.00

TABLE NO. 4

Cost of Production per Acre

Variation in Cost per Ton and per Acre

Number of Farms	Yield per Acre	Cost per Ton	Cost per Acre	Total Cost	Interest on Land	Taxes	Depreciation	Labor	Horse Hire	Motor Power	Seed	Fertilizer	Threshing	Miscellaneous
1	0.5	$ 4.00	$ 2.00	$ 2.00	$ 0.40	$ 0.11	$ 0.08	$ 0.44	$ 0.07	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.90
2	0.6	4.00	2.40	2.40	0.48	0.13	0.09	0.53	0.08	0.00	0.00	0.00	0.00	1.10
3	0.7	4.00	2.80	2.80	0.56	0.15	0.11	0.62	0.09	0.00	0.00	0.00	0.00	1.27
4	0.8	4.00	3.20	3.20	0.64	0.17	0.12	0.71	0.10	0.00	0.00	0.00	0.00	1.46
5	0.9	4.00	3.60	3.60	0.72	0.19	0.14	0.80	0.11	0.00	0.00	0.00	0.00	1.64
6	1.0	4.00	4.00	4.00	0.80	0.21	0.15	0.89	0.12	0.00	0.00	0.00	0.00	1.83
7	1.1	4.00	4.40	4.40	0.88	0.23	0.17	0.98	0.13	0.00	0.00	0.00	0.00	2.01
8	1.2	4.00	4.80	4.80	0.96	0.25	0.18	1.07	0.14	0.00	0.00	0.00	0.00	2.20
9	1.3	4.00	5.20	5.20	1.04	0.27	0.20	1.16	0.15	0.00	0.00	0.00	0.00	2.38
10	1.4	4.00	5.60	5.60	1.12	0.29	0.21	1.25	0.16	0.00	0.00	0.00	0.00	2.57
11	1.5	4.00	6.00	6.00	1.20	0.31	0.23	1.34	0.17	0.00	0.00	0.00	0.00	2.75
12	1.6	4.00	6.40	6.40	1.28	0.33	0.24	1.43	0.18	0.00	0.00	0.00	0.00	2.94
13	1.7	4.00	6.80	6.80	1.36	0.35	0.26	1.52	0.19	0.00	0.00	0.00	0.00	3.12
14	1.8	4.00	7.20	7.20	1.44	0.37	0.27	1.61	0.20	0.00	0.00	0.00	0.00	3.31
15	1.9	4.00	7.60	7.60	1.52	0.39	0.29	1.70	0.21	0.00	0.00	0.00	0.00	3.49
16	2.0	4.00	8.00	8.00	1.60	0.41	0.30	1.79	0.22	0.00	0.00	0.00	0.00	3.68
17	2.1	4.00	8.40	8.40	1.68	0.43	0.32	1.88	0.23	0.00	0.00	0.00	0.00	3.86
18	2.2	4.00	8.80	8.80	1.76	0.45	0.33	1.97	0.24	0.00	0.00	0.00	0.00	4.05
19	2.3	4.00	9.20	9.20	1.84	0.47	0.35	2.06	0.25	0.00	0.00	0.00	0.00	4.23
20	2.4	4.00	9.60	9.60	1.92	0.49	0.36	2.15	0.26	0.00	0.00	0.00	0.00	4.42
21	2.5	4.00	10.00	10.00	2.00	0.51	0.38	2.24	0.27	0.00	0.00	0.00	0.00	4.60
22	2.6	4.00	10.40	10.40	2.08	0.53	0.39	2.33	0.28	0.00	0.00	0.00	0.00	4.79
23	2.7	4.00	10.80	10.80	2.16	0.55	0.41	2.42	0.29	0.00	0.00	0.00	0.00	4.97
24	2.8	4.00	11.20	11.20	2.24	0.57	0.42	2.51	0.30	0.00	0.00	0.00	0.00	5.16
25	2.9	4.00	11.60	11.60	2.32	0.59	0.44	2.60	0.31	0.00	0.00	0.00	0.00	5.34
26	3.0	4.00	12.00	12.00	2.40	0.61	0.45	2.69	0.32	0.00	0.00	0.00	0.00	5.53
27	3.1	4.00	12.40	12.40	2.48	0.63	0.47	2.78	0.33	0.00	0.00	0.00	0.00	5.71
28	3.2	4.00	12.80	12.80	2.56	0.65	0.48	2.87	0.34	0.00	0.00	0.00	0.00	5.90
29	3.3	4.00	13.20	13.20	2.64	0.67	0.50	2.96	0.35	0.00	0.00	0.00	0.00	6.08
30	3.4	4.00	13.60	13.60	2.72	0.69	0.51	3.05	0.36	0.00	0.00	0.00	0.00	6.27
31	3.5	4.00	14.00	14.00	2.80	0.71	0.53	3.14	0.37	0.00	0.00	0.00	0.00	6.45
32	3.6	4.00	14.40	14.40	2.88	0.73	0.54	3.23	0.38	0.00	0.00	0.00	0.00	6.64
33	3.7	4.00	14.80	14.80	2.96	0.75	0.56	3.32	0.39	0.00	0.00	0.00	0.00	6.82
34	3.8	4.00	15.20	15.20	3.04	0.77	0.57	3.41	0.40	0.00	0.00	0.00	0.00	7.01
35	3.9	4.00	15.60	15.60	3.12	0.79	0.59	3.50	0.41	0.00	0.00	0.00	0.00	7.19
36	4.0	4.00	16.00	16.00	3.20	0.81	0.60	3.59	0.42	0.00	0.00	0.00	0.00	7.38
37	4.1	4.00	16.40	16.40	3.28	0.83	0.62	3.68	0.43	0.00	0.00	0.00	0.00	7.56
38	4.2	4.00	16.80	16.80	3.36	0.85	0.63	3.77	0.44	0.00	0.00	0.00	0.00	7.75
39	4.3	4.00	17.20	17.20	3.44	0.87	0.65	3.86	0.45	0.00	0.00	0.00	0.00	7.93
40	4.4	4.00	17.60	17.60	3.52	0.89	0.66	3.95	0.46	0.00	0.00	0.00	0.00	8.12
41	4.5	4.00	18.00	18.00	3.60	0.91	0.68	4.04	0.47	0.00	0.00	0.00	0.00	8.30
42	4.6	4.00	18.40	18.40	3.68	0.93	0.69	4.13	0.48	0.00	0.00	0.00	0.00	8.49
43	4.7	4.00	18.80	18.80	3.76	0.95	0.71	4.22	0.49	0.00	0.00	0.00	0.00	8.67
44	4.8	4.00	19.20	19.20	3.84	0.97	0.72	4.31	0.50	0.00	0.00	0.00	0.00	8.86
45	4.9	4.00	19.60	19.60	3.92	0.99	0.74	4.40	0.51	0.00	0.00	0.00	0.00	9.04
46	5.0	4.00	20.00	20.00	4.00	1.01	0.75	4.49	0.52	0.00	0.00	0.00	0.00	9.23

As would normally be expected, in types having a dense Ribes population the acreage cost is high and the cost per bush is low. The reverse has a tendency to reduce the cost per acre and increase the cost per bush. Variations from a direct ratio in this regard are explained by the differences in working conditions. In types where Ribes occur in dense brush the cost per acre and per bush is higher than would be expected in considering only the number of Ribes.

VI. Cost Computations

A. Method of deriving cost figures:

As the results of Ribes eradication are largely measured in terms of cost per acre, an analysis of the procedure in determining costs is of importance. The following tables form the basis for all cost computations:

Table No. 6 is a summary of the gross expenses of the project. It includes the expenses of methods studies, plot studies, in cooperation with the California Forest Experiment Station, checking work, 1928 pre-eradication work and cost of meals served to official visitors. All studies except checking work are not properly chargeable to actual eradication work and have been deducted in the computation of eradication costs.

As would normally be expected, in types having a dense Ribes population the average cost is high and the cost per bush is low. The reverse has a tendency to reduce the cost per acre and increase the cost per bush. Variations from a direct ratio in this regard are explained by the differences in working conditions. In types where Ribes occur in dense brush the cost per acre and per bush is higher than would be expected in considering only the number of Ribes.

II. Cost Computations

A. Method of deriving cost figures:

As the result of Ribes eradication are largely measured in terms of cost per acre, an analysis of the procedure in determining costs is of importance. The following tables form the basis for all cost computations:

Table No. 6 is a summary of the gross expenses of the project. It includes the expenses of methods studies, plot studies, in cooperation with the California Forest Experiment Station, checking work, 1928 pre-eradication work and cost of meals served to official visitors. All studies except checking work are not properly chargeable to actual eradication work and have been deducted in the computation of eradication costs.

TABLE NO. 5

Variation in Cost on Various Aged Logging Areas

Eradication Type	Acres	Ribes per Acre	Time to Eradicate: Crew-man Days	Fore-man Days	Scout Days	Total	Total Cost	Cost per Acre	Cost per Ribes Pulled	Percentages of Total: Acres	Ribes	Work-ing Time	Cost
SP-YP Mat.	990.4	6.7	23.0	7.0	46.50	81.50	$ 487.07	$ 0.49	$0.073	28.01	3.16	6.85	6.90
SP-YP Cut. 1-2 yrs.	758.1	4.19	0	0	56.93	56.93	343.18	0.45	0.108	21.44	1.51	4.79	4.86
SP-YP Cut. 3-4 yrs.	235.0	41.1	0	0	45.0	45.0	271.26	1.15	0.028	6.65	4.58	3.78	3.84
SP-YP Cut. 7-8 yrs.	140.2	159.0	37.7	9.0	24.0	70.7	420.44	3.00	0.019	3.96	10.50	5.95	5.96
SP-Fir Mat.	353.9	33.09	89.5	21.12	3.0	113.62	671.23	1.89	0.049	10.01	6.39	9.55	9.51
SP-Fir Cut. 1-2 yrs.	71.0	53.5	0	0	10.25	10.25	61.79	0.87	0.015	2.01	1.96	0.86	0.87
SP-Fir Cut. 3-4 yrs.	637.4	113.42	346.02	85.0	24.75	455.77	2,694.51	4.23	0.037	18.02	34.25	38.33	38.18
SP-Fir Cut. 7-8 yrs.	200.1	124.3	85.4	21.0	23.0	129.4	767.14	3.83	0.031	5.66	11.77	10.88	10.88
Stream-Mat.	74.6	80.3	31.5	7.87	10.37	49.74	295.40	3.96	0.049	2.11	2.84	4.18	4.19
Stream Cut. 1-2 yrs.	49.0	261.69	20.0	5.0	22.37	47.37	282.44	5.76	0.022	1.38	6.08	3.99	4.00
Stream Cut. 7-8 yrs.	26.7	1,340.53	100.81	23.13	0	128.94	762.72	28.57	0.021	0.75	16.96	10.84	10.81
Totals & Averages	3,536.4	59.68	738.93	184.12	266.17	1,189.22	$7,057.18	$ 2.00	$0.034	100.00	100.00	100.00	100.00

TABLE No. 3

Variation in Cost on Various Grand Logging Areas

Formation Type	Acres	Miles per Acre	Time to Prepare Camp Days	Time to Prepare Permanent Days	Time to Prepare Total	Cost per Acre	Total Cost	Percentage of Total Cost per Acre	Percentage of Total Working Time	Cost per 1,000 Feet
Ridge-Tip Flat.	640.4	4.7	25.3	7.0	44.30	$1.50	$ 487.07	$0.078	32.01	7.16	8.87	6.90
Ridge-Tip Cut. 1-2 Pre.	742.1	4.10	0	0	54.34	56.34	748.18	0.49	21.44	1.01	4.74	4.82
Ridge-Tip Cut. 3-4 Pre.	858.0	41.1	0	3	45.0	46.0	371.28	0.048	6.35	4.68	2.74	3.84
Ridge-Tip Cut. 5-8 Pre.	180.3	109.0	32.7	9.0	54.0	70.7	420.44	0.049	2.38	10.80	6.84	8.18
Ridge-Flat Flat.	178.3	14.24	54.3	23.14	4.0	114.42	471.32	1.38	0.348	10.01	6.89	9.01
Ridge-Flat Cut. 1-2 Pre.	72.0	58.8	0	1	10 24	10.24	61.74	0.87	0.178	8.01	1.38	0.85	0.87
Ridge-Flat Cut. 3-4 Pre.	827.4	113.42	146.00	58.0	84.72	448.72	2,384.51	4.28	0.017	13.32	84.84	24.32	28.15
Ridge-Flat Cut. 5-8 Pre.	200.1	124.3	84.4	21.0	22.0	128.4	772.14	2.32	0.021	6.86	13.77	10.84	10.88
Stream-Bot.	74.8	80.3	21.4	7.47	10.17	42.74	256.43	1.82	0.045	2.11	0.84	4.18	4.72
Stream Cut. 1-2 Pre.	84.6	82.4	8.0	21.17	47.27	378.44	8.70	0.028	1.32	8.08	2.44	4.00
Stream Cut. 3-8 Pre.	84.1	100.8	24.12	0	1.25.34	108.72	88.87	0.021	0.75	15.44	10.84	13.81
Total & Average	3,826.4	89.88	724.89	184.12	266.17	1,189.28	87,087.18	40.07%	100.00	100.00	100.00	100.00

TABLE NO. 6

Analysis of Costs

Gross Charges for Entire Project, all Sub-projects Included			% of Total
I. Payroll			
1. Supervision - - - - - - - - - - - - - - - - -	$	601.76	
(Salary and expenses of supervisor other than subsistence)			
2. Labor -		4,178.34	
(Salaries of crewmen, foreman, checker and scout)			
Total	$	4,780.10	61.53
II. Subsistence			
1. Cost of supplies - - - - - - - - - - - - -		1,670.49	
(Purchased at Sonora, California)			
2. Transportation of supplies - - - - - - - -		132.20	
(From Sonora to Blister Rust Camp)			
3. Cost of Cooking - - - - - - - - - - - - -		573.33	
(Salaries paid cook and flunkey and their expenses to and from Sonora)			
Total	$	2,376.02	30.58
III. Transportation of Men			
1. From place of Hire (Sonora) to B.R. camp		90.00	
2. To and from camp to place of work - - -		40.00	
3. Pre-eradication transportation - - - -		75.99	
(men and equip. from Sonora to Dorrington)			
Total	$	205.99	2.65
IV. Equipment			
1. 1/3 - 1927 purchase - - - - - - - - - - - -		162.20	
2. 1/3 - 1926 purchase - - - - - - - - - - - -		33.03	
3. 1/3 - 1925 purchase - - - - - - - - - - - -		26.35	
4. Supplies, etc. (not subsistence)- - - - -		142.10	
5. Transportation of Equipment by com. carrier		30.00	
6. " " " " personal car		15.00	
Total	$	406.68	5.24
			100.00
Grand Total for Project - - - - -	$7,768.79		

TABLE NO. 6

Analysis of Costs

Items Charged for Entire Project, and Sub-projects Included		% of Total
I. Payroll		
1. Supervision - (Salary and expenses of supervisor other than subsistence)	$ 801.76	
2. Labor - (Salaries of crewmen, foremen, checker and admin)	4,178.24	
Total	$ 4,980.00	81.83
II. Subsistence		
1. Cost of supplies - (Purchased at Monora, California)	1,870.49	
2. Transportation of supplies - - - - - - - - - - - - - - (From Monora to Minter Dam Camp)	132.80	
3. Cost of Cooking - (Salaries paid cook and flunkey and their expenses to and from Monora)	272.72	
Total	$ 2,276.00	30.58
III. Transportation of Men		
1. From place of Hire (Monora) to T.T. camp - - - - - -		80.00
2. To and from camp to place of work - - - - - - - - -		40.00
3. Pre-orediting transportation - - - - - - - - - - - (see sub supply. From Monora to Derring-ton)		72.49
Total	$ 192.49	2.62
IV. Equipment *		
1. 1/3 - 1927 purchase - - - - - - - - - - - - - - - - -		182.00
2. 1/3 - 1926 purchase - - - - - - - - - - - - - - - - -		32.44
3. 1/3 - 1928 purchase - - - - - - - - - - - - - - - - -		26.87
4. Sup.illan. exc. (not subsistence) - - - - - - - - -		140.12
5. Transportation of Equipment by com. carrier - - - -		30.00
6. " " " " Personal car - - - - - - - -		17.00
Total	$ 428.43	5.84
Grand Total for Project - - - - - -	$7,376.92	100.00

Equipment" : One-third of the cost of all equipment is charged each year against the project using it. This presupposes that in three years all equipment will be worn out, destroyed, or broken.

In determining the net cost of eradication the following deductions to the gross costs of the project are made:

Cost of methods work - - - - - - - - - - - -	$ 142.08
Cost of plot studies in cooperation with California Forest Experiment Station	
Cow Creek Fencing Job - -	161.76
Cow Creek Ribes Studies -	63.75
Cost of 1928 pre-eradication - - - - - - -	259.67
Cost of meals served to visiting Forest officials, State officials, Blister Rust Control officials, and Blister Rust reconnaissance men - - - - - - - - - - - - -	84.35
Total deductions - - -	711.61

The cost of these various studies will be taken up in detail under the discussion of each.

Gross cost of project - - - - - - - - - - -	$ 7,768.79
	- 711.61
Net Cost of Eradication - - - -	$7,057.18

A checking cost of $192.50 is included in the net cost of eradication, since the checking work is a necessary part of the eradication job.

1. Composite man-day charges

The cost per acre for the various eradication types and blocks was determined by the computation of a composite man-day charge. This composite charge was added to the daily wage for each class of labor. Cost per block and type was then determined by multiplying the composite charge by the number of man days of each class of labor employed on each block and type. This necessitated the computations as follows:

Average daily pay of crew foreman - - - - - - - -	$ 3.10
Average daily pay of scout crewman - - - - - - - -	2.90
Average daily pay of crewman - - - - - - - - -	2.70

Equipment" : One-third of the cost of all equipment is charged each year against the project using it. This presupposes that in three years all equipment will be worn out, destroyed, or broken.

In determining the net cost of eradication the following deductions to the gross costs of the project are made:

Cost of methods work - - - - - - - - - - - - - -	$ 162.05
Cost of plot studies in cooperation with California Forest Experiment Station	
Cow Creek Fencing Job - -	163.75
Cow Creek Mines Station - -	83.75
Cost of 1934 pre-eradication - - - - - - - -	259.87
Cost of meals served to visiting Forest officials, State officials, Minister Hunt	
Control officials, and Minister Hunt re-	
sponsible men - - - - - - - - - - - - - -	84.35
Total deductions - - -	711.67

The cost of these various studies will be taken up in detail under the discussion of each.

Gross cost of project - - - - - - - - - - - -	$ 7,758.79
- 711.67	
Net Cost of Eradication - - - -	$ 7,047.12

A checking cost of $192.50 is included in the net cost of eradication, since the checking work is a necessary part of the eradication job.

1. Composite per-day charges

The cost per acre for the various eradication types and blocks was determined by the computation of a composite man-day charge. This composite charge was added to the daily wage for each class of labor. Cost per block and type was then determined by multiplying the composite charge by the number of man days of each class of labor employed on each block and type. This necessitated the computations as follows:-

Average daily pay of crew foreman - - - - - - - -	$ 3.50
Average daily pay of next crewman - - - - - - - -	3.50
Average daily pay of crewman - - - - - - - - - -	3.70

Total time spent on eradication:

Crew-foreman days - - - - - - - -	184.12
Scout crewman days - - - - - - -	266.17
Crewman days - - - - - - - - - -	738.93
Total man days -	1,189.22

184.12 foreman days	@ $3.10 - - - - - -	$ 570.77
266.17 scout days	@ 2.90 - - - - - -	771.89
738.93 crewman days	@ 2.70 - - - - - -	1,995.11
	Total labor charge	$3,337.77

Total net field cost of project - - -	$7,057.18
Total net labor cost of project - - -	-3,337.77
Balance	$3,719.41

Total man days = 1,189.22

$\frac{3719.41}{1189.22}$ = $3.128 composite charge per man day

Total cost of foreman day = $ 6.228) These figures applied to number
Total cost scout crewman = 6.028) of various man days spent on each
Total cost of crewman = 5.828) type will give cost of eradication on type.

$\frac{7057.18}{1189.22}$ = $5.934 cost of average man day

All costs, other than salary paid these various classes of labor for days spent on actual eradication of Ribes, are included in the composite balance. This composite balance includes salary of field supervisor, and his assistant (scout), salary paid while traveling, costs of meals, cost of equipment used, cost of transportation, etc.

2. Meal costs

Meal cost is an item of expense which will vary from year to year due to the variation in cost of supplies, variation in size of camp, and efficiency of cook employed. The following table shows the number of meals served at the eradication camp, segregated under the various studies to which served.

Number of Meals Served

Eradication -	5,501
Methods studies - - - - - - - - - - - - - - - - -	110
Checking -	126
Cooperation studies with California Forest Experiment Station	
Cow Creek Ribes studies - -	45
" " fencing job - - -	105
Pre-eradication - - - - - - - - - - - - - - - - -	90

Total time spent on eradication:

Crew-foreman days - - - - - - - -	184.18
Scout crewman days - - - - - - -	958.17
Crewman days - - - - - - - - - -	726.82
Total man days -	1,189.82

184.18 foreman days @ $3.10 - - - - -	$ 570.77
958.17 scout days @ 2.90 - - - - -	778.89
726.82 crewman days @ 2.70 - - - -	1,958.11
Total labor charges	7.77

Total net field cost of project - - -	$7,087.18
Total net labor cost of project - - -	3,337.77
Balance	$ 7.41

Total man days = 1,189.82

$\frac{3749.41}{1189.82}$ = $3.158 composite charge per man day

Total cost of foreman day = (6.238) These figures applied to number
Total cost scout crewman = 5.028) of various man days spent on each
Total cost of crewman = 3.838) type will give cost of eradication on type.

$\frac{7087.18}{1189.82}$ = $5.954 cost of average man day

All costs, other than salary paid these various classes of labor for days spent on actual eradication of Ribes, are included in the composite balance. This composite balance includes salary of field supervisor, and his assistant (scout), salary paid while traveling, costs of meals, cost of equipment used, cost of inspection, etc.

3. Meal costs

Meal cost is an item of expense which will vary from year to year due to the variation in cost of supplies, variation in size of camp, and efficiency of cook employed. The following table shows the number of meals served at the eradication camp, segregated under the various studies to which served.

Number of Meals Served

Eradication -	5,801
Methods studies -	110
Checking -	156
Cooperation studies with California Forest Experiment Station - - -	
Cow Creek Ribes studies - -	45
" " Tensleep job - - -	108
Pre-eradication -	80

Official visitors - - - - - - - - - - - - - - - - - -	220
Total	6,197

Total subsistence cost = $2,376.02 .

$\frac{2376.02}{6197}$ = $0.3834 cost of each meal.

The following table shows the various items entering into the cost of operating the eradication camp and the proportions of the per acre cost each item shares:

TABLE NO. 7

Analysis of Field Expenditures, Experimental Ribes Eradication
California, 1927

Item	Total Expenditure	Per cent of Total	Cost per Acre
Salary and subsistence for time actually spent in the eradication of Ribes	$ 4,705.61	66.67	$1.34
Salary, subsistence and expenses (meals away from camp, travel) of supervision	660.62	9.36	.19
Subsistence for all men for Sundays, holidays, and sick time	307.25	4.35	.09
Salaries and subsistence for all travel time, camp construction time, cooks meals, and work other than actual Ribes digging	598.52	8.49	.17
Cost of Equipment Cost of transportation of Equipment and Men	536.68	7.61	.15
Cost of checking	192.50	2.72	.05
Cost of string	56.00	0.80	.01
Totals	$ 7,057.18	100.00	2.00

Exhibit J

Estimate of Fully Developed Permanent Water Supply Facilities

(Contd.)

Item	Estimated cost	Per cent to total cost	Remarks
Laying and maintenance for three seasons in the			
Completion of pipe line (Usual)			
Water service and connections (usual)			
Chlorination			
Purchase and maintenance for all time, boats and motor launches			
Cost of pumping plant (Usual)			
Cost of pumping machinery at well-mouth			
Cost of pipe line			
Cost of site			
Total			

VII. Supplementary Work in Connection with Ribes Eradication

A. Checking

To assist in keeping the eradication work of the crews at a high level several methods of checking work were carried out during the season. In order to impress upon the crewmen the need for thoroughness and to assist them in maintaining a high efficiency the practice of having a crew check their work from time to time during the day was followed. This consisted in reversing a crew after the completion of a strip, or whenever the foreman felt the need of it, so that each man was checking another's work. A crew thus followed back over a specified distance of their eradicated strip and any missed bushes found were destroyed.

Another method used in keeping the crews alert was by the use of numerous check plots and strips in advance of eradication. These plots would be established without the crew's knowledge of their location. All Ribes were counted and the total feet of live stem for the plot recorded. The crew in the course of a day's work eradicated the plots, and they were subsequently checked. The results of each crew's work were posted on the camp bulletin board.

At least two per cent of the area of all eradicated blocks was systematically checked by the strip method. The strip method of checking consisted in the running of parallel strips at uniform intervals across the block in such a direction as to best encounter average conditions. Two men constituted a checking crew, one man running compass and the other acting as recorder. Both searched for missed Ribes. Generally a rod-wide strip was covered, but on the more open areas, where the visibility would permit, a strip two rods wide was checked. A sufficient number of strips were run across a block to give a two per cent check, and the interval between strips was such as to have them occur uniformly over the entire block.

An average of 3.53 Ribes, containing 15.63 feet of leaf-bearing stem were missed per acre on the eradicated area. Ninety-four per cent of the bushes and 97.33 per cent of the leaf-bearing stem originally on the area were eradicated. Table No. 8 gives a complete check on all bushes eradicated during the season and the efficiency of eradication for each type.

VII. Supplementary Work in Connection with Slope Eradication

A. Checking

To assist in keeping the eradication work of the crews at a high level several methods of checking work were carried out during the season. In order to impress upon the crewmen the need for thoroughness and to assist them in maintaining a high efficiency the practice of having a crew check their work from time to time during the day was followed. This consisted in reversing a crew after the completion of a strip, or whenever the foreman felt the need of it, so that each man was checking another's work. A crew thus followed back over a specified distance of their eradicated strip and any missed bushes found, were destroyed.

Another method used in keeping the crews alert was by the use of numerous check plots and strips in advance of eradication. These plots would be established without the crew's knowledge of their location. All Ribes were counted and the total feet of live stem for the plot recorded. The crew in the course of a day's work eradicated the plots, and they were subsequently checked. The result of each crew's work were posted on the camp bulletin board.

At least two per cent of the area of all eradicated blocks was systematically checked by the strip method. The strip method of checking consisted in the running of parallel strips at uniform intervals across the block in such a direction as to best encounter average conditions. Two men constituted a checking crew, one man running compass and the other acting as recorder. Both searched for missed Ribes. Generally a rod-wide strip was covered, but on the more open areas, where the visibility would permit, a strip two rods wide was checked. A sufficient number of strips were run across a block to give a two per cent check, and the interval between strips was such as to have them occur uniformly over the entire block.

An average of 3.56 Ribes, containing 15.63 feet of bearing area were missed per acre on the eradicated area. Ninety-four per cent of the bushes and 97.33 per cent of the leaf-bearing stem originally on the area were eradicated. Table No. 6 gives a complete check on all bushes eradicated during the season and the efficiency of eradication for each type.

TABLE NO. 8

Efficiency of Eradication by Type

Type	Acres	Bushes Pulled per Acre			Leaf-bearing Stem Pulled per Acre			Bushes Missed per Acre			Leaf-bearing Stem Missed per Acre			Efficiency	
		G.roez	R.nev.	Total	G.roezli	R.nevad.	Total	G.roe	R.nev.	Total	G.roez	R.nev.	Total	By No. of Bushes	By Live Stem
S.P.-Y.P. Mat.	990.4	6.3	0.4	6.7	60.04	3.83	63.87	1.1	0.03	1.13	8.37	0.12	8.49	85.57	88.27
S.P.-Y.P. Cutover	1,133.3	30.0	0.8	30.8	285.90	7.67	293.56	2.04	0.06	2.10	9.15	0.03	9.18	95.62	96.97
S.P.-Fir Mat.	353.9	34.0	4.09	38.1	324.02	39.18	363.20	2.22	0.90	3.12	7.70	0.42	8.12	92.43	97.81
S.P.-Fir Cutover	908.5	104.0	7.4	111.4	991.12	70.89	1,062.01	5.07	0.65	5.72	24.41	4.08	28.49	95.12	97.39
Stream Mat.	74.6	28.5	51.5	80.3	271.61	496.24	767.85	1.93	5.83	7.76	7.80	24.77	32.57	91.19	95.93
Stream Cutover	75.7	214.3	427.9	642.2	2,042.28	4,099.28	7,141.56	10.12	12.55	22.67	28.71	11.23	39.94	96.59	99.44
Totals &Averages	3,536.4	46.72	12.96	59.68	445.24	124.15	569.79	2.85	0.68	3.53	13.65	1.98	15.63	94.42	97.33

Average feet live stem pulled bush = 9.55

Average feet live stem missed bush = 4.42

Table No. 6

Efficiency of Production by Type

Type	Acres	Bushels Pulled per Acre			Leaf-Bearing Stem Pulled per Acre			Bushels Stripped per Acre			Leaf-Bearing Stem Stripped per Acre			Efficiency	
		S.trop.	S.pecr.	Total	S.tropical	S.secred.	Total	S.tropical	S.secred.	Total	S.tropical	S.secred.	Total	No. of Bushels	% Live Stem
N.P.-T.P. Ext.	420.4	8.3	0.4	8.7	60.0%	3.8%	63.8%	1.1	.05	1.15	8.37	0.13	8.46	54.87	52.47
N.P.-T.P. Centers	1,252.2	30.0	0.8	30.8	185.30	7.07	192.38	8.04	0.30	4.34	9.13	0.34	9.48	52.62	46.47
N.P.-T.P. Ext.	262.6	24.3	4.0%	28.3	834.02	34.18	868.20	8.72	0.30	9.02	7.75	0.42	8.12	44.44	47.81
S.P.-Pit. Centers	974.8	104.0	7.4	111.4	921.32	70.89	1,062.01	5.07	0.46	5.78	84.41	4.38	88.69	96.18	47.23
Stream Ext.	74.6	41.8	3.3	45.1	431.61	496.84	767.65	1.61	5.83	7.74	7.80	84.77	92.57	41.19	45.53
Stream Centers	72.1	814.3	647.9	462.2	3,048.88	4,243.38	7,183.76	13.18	14.65	42.67	26.71	11.32	38.04	46.89	44.44
Totals Averages	3,816.4	41.76	12.96	54.72	446.74	184.15	630.89	8.87	2.64	11.51	15.85	1.96	17.81	44.49	47.38

Average Feet live stem pulled bush. = 3.85

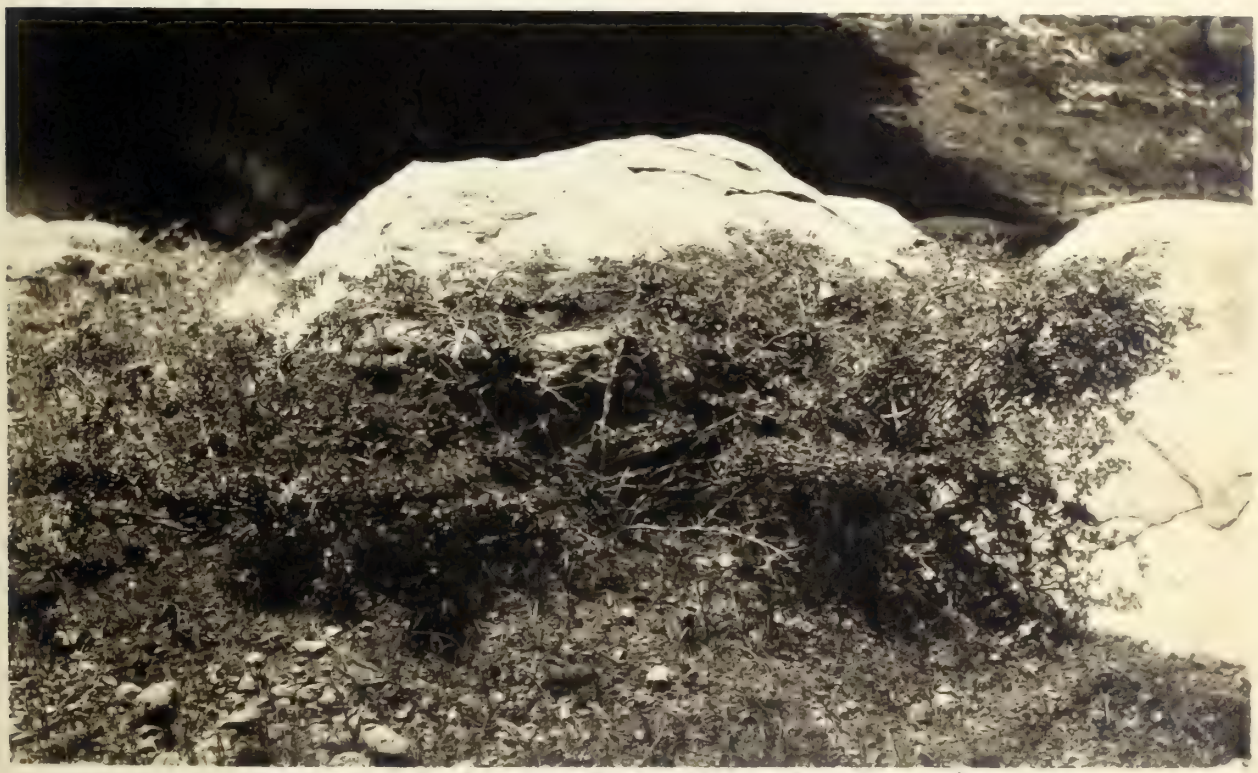
Average Feet live stem stripped bush. = 4.49



W. 235. Large G. roezli in sugar pine-fir type.



W. 238. G. roezli and R. nevadense side by side in stream type.



W. 538. G. roezli growing at base of granite rock outcropping.

A list, according to the site on which found, was kept for each Ribes species checked during the season. Table No. 9 shows the various sites on which Ribes were missed and the number missed on each site.

TABLE NO. 9

Site of Missed Ribes

Site	Total Missed	G. roezli	R. nevadense
Rock Outcrops	23	18	5
Raised Ground Adjacent Mature Trees	16	16	0
Damp Slope	16	12	4
Alder Bottoms	7	1	6
Dry Draws	1	1	0
Mulch of Decayed Branches	58	44	14
In Dense Brush	78	78	0
On Creek Banks	52	26	26
Covered by Pulled Ribes	22	17	5
In Mixture with Annual Plants	37	23	14
In Bear Clover	21	21	0
Windfalls and Down Logs	24	20	4
Totals	355	277	78

A list, according to the site on which found, was kept for each Ribes species checked during the season. Table No. 9 shows the various sites on which Ribes were missed and the number missed on each site.

TABLE NO. 9

Site of Missed Ribes

Site	Total missed	O. rosaii	R. cereanae
Rock Outcrops	23	18	5
Raised Ground Adjacent Mature Trees	18	18	0
Damp Slope	16	12	4
Alder Bottoms	7	1	6
Dry Dykes	1	1	0
Mouth of Covered Trenches	58	44	14
In Long Grass	78	74	3
On Creek Banks	52	36	16
Covered by Tufted Hills	22	17	5
In Pasture with Annual Plants	27	21	6
In Bear Clover	21	21	0
Windfalls and Down Logs	24	20	4
Totals	355	277	78

To assist in accounting for the reasons for missed bushes, a record was kept throughout the season of the relation of missed Ribes to the surrounding brush cover. The summarized results of this study are shown in Table No. 10.

TABLE NO. 10

Relation of Missed Ribes to Adjacent Brush

Relation to Surroundings	Total Missed	G.roezli Missed	R.nevadense Missed	% of Total Missed
Hidden by Brush	79	68	11	22.26
Partially hidden by Brush	68	58	10	19.15
Visible Above Brush	69	39	30	19.43
No Brush near Ribes	139	112	27	39.16
Totals	355	277	78	100.00

1. Checking costs

Labor

25 man days	@	$ 3.66 =	$ 91.50
17 " "	@	3.10 =	52.70
126 meals	@	0.3834 =	48.30
Total checking cost			$192.50

Cost of checking per acre = $ 0.054
This cost is included in the eradication costs.

B. Plot Studies

1. Root and crown studies

During the 1926 field season several plots were established on which the Ribes were eradicated in different manners. Some plants were cut off just above the ground, leaving the crown and root system intact; some just below the crown, leaving the remainder of the root system in the ground but exposed to the sun; and some just below the crown with the remainder of the roots covered with soil. These plots were established on all eradication types and were repeated each month. Examinations made in July, August and September of 1926 on plots established in June, July and August respectively of that year, disclosed growth in all cases, on all sites, where any part of the crown had been left in the ground and in no case was there any evidence of rejuvenation where all the crown had been taken out. Examinations made on these plots in June and August of 1927 showed no change in the above conditions. Examinations to the remaining roots of Ribes showing no growth (all of crown having been removed) showed the roots to be dying back from the top, but still not completely dead. Bushes having part of crown remaining had vigorous sprouts.

To assist in accounting for the reasons for missed bushes, a record was kept throughout the season of the relation of missed Ribes to the surrounding brush cover. The summarized results of this study are shown in Table No. 10.

TABLE NO. 10

Relation of Missed Ribes to Adjacent Brush

Relation to Surrounding	Total Missed	No. Found Missed	% of Missed	% of Total Missed
Hidden by Brush	75	56	11	74.76
Partially Hidden by Brush	64	52	10	15.15
Visible Above Brush	50	46	30	15.62
No Brush near Ribes	139	113	27	39.13
Totals	328	277	78	100.00

1. Checking costs

Labor

25 man days @ $ 3.66	=	$ 91.50
17 " " @ 3.10	=	52.70
126 meals @ 0.3634	=	45.80
Total checking cost		$190.50

Cost of checking per acre = $ 0.05¢

This cost is included in the eradication costs.

2. Plot studies

1. Fort and crown studies

During the 1926 field season several plots were established on which the Ribes were eradicated in different manners. Some plants were cut off just above the ground, leaving the crown and root system intact; some just below the crown, leaving the remainder of the root system in the ground but exposed to the sun; and some just below the crown with the remainder of the roots covered with soil. These plots were established on all eradication types and were repeated each month. Examinations made in July, August and September of 1926 on plots established in June, July and August respectively of that year, disclosed growth in all cases, on all sites, where any part of the crown had been left in the ground and in no case was there any evidence of retravenation where all the crown had been taken out. Examinations made on these plots in June and August of 1927 showed no change in the above conditions. Examinations to the remaining roots of Ribes showing no growth (all of crown having been removed) showed the roots to be dying back from the top, but still not completely dead. Bushes having part of crown remaining had vigorous roots.

Numerous sprouts from improperly eradicated Ribes bushes on part of the 1926 eradication area clearly showed that the crewmen were not getting enough of the root system. Examinations of many of these sprouted Ribes over the area were made. In the large majority of them it was apparent that sprouting was from a remaining portion of the crown. However, several cases were noted where sprouting seemed to have occurred from below the crown. Accordingly the crews were instructed to get out all of the roots possible. Two large plots containing several hundred Ribes of both species of Ribes were then established and a further study of roots and crowns was made. All plants were permanently staked and numbered and the exact amount of the root system removed was recorded. Various amounts of root was removed. These studies should give some conclusive evidence of regrowth of Ribes on eradicated areas.

2. Special Ribes data

Throughout the field season, the checking men, when not engaged on checking work, gathered leaf-bearing stem data on the two species of Ribes. A recorder would work behind an eradication crew and estimate the leaf-bearing stem on all Ribes eradicated. This was done on several of the types, the lack of time preventing a complete record of all types and slopes. Sufficient data on each species of Ribes were obtained to get a fairly accurate estimate of leaf-bearing stem on several types. These data were used in securing the leaf-bearing stem figures in the checking table (No. 8). Table No. 11 shows the results of this study.

TABLE NO. 11

Average Feet Leaf-bearing Stem by Type

Species of Ribes	Type and Slope	No. of bushes Measured	Feet Leaf-bearing Stem per Av.bush	Height of Av. Bush
G. roezli	N. slope S.P.Fir Cut-over	2,872	9.53 ft.	0.77 ft
R. nevadense	N. slope Cut-over-Stream	5,136	9.58 "	1.72 "
G. roezli	S. slope cutover Stream	1,270	11.19 "	1.66 "
"	S. slope S.P.Y.P. Mat.	149	9.39 "	0.89 "

Species of Ribes	Type and Slope	No. of bushes per acre	Feet leaf-bearing stem per bush	Height of bush
G. roezlii	S. slope S.F.Y.F. Cut-over	3,672	5.81 ft.	2.72 ft.
R. petiolare	N. slope Cut-over-Stream	5,128	4.98 "	1.72 "
G. roezlii	E. slope entrance Stream	1,470	11.19 "	1.44 "
"	S. slope S.Y.F. Det.	142	5.76 "	0.89 "

TABLE NO. 12

Feet Leaf-bearing Stem per Acre by Types

Type	G. roezli	R.nevadense	Total
S.P.-Y.P. Mat.	60.04 ft.	3.83 ft	63.87 ft
" Cut.	285.90 "	7.67 "	293.56 ft
S.P.-Fir Mat.	324.02 "	39.18 "	363.20 "
" Cut.	991.12 "	70.89 "	1,062.01 "
Stream Mat.	271.61 "	496.24 "	767.85 "
" Cut.	2,042.28 "	4,099.28 "	7,141.56 "

3. Cost of plot studies

a. Payroll $ 99.52
b. Subsistence 42.557 (111 meals @ $0.3834)
$142.077

C. Studies in Cooperation with California Forest Experiment Station

1. Cow Creek fencing job

In order to protect the Cow Creek study plot from damage by trespassing sheep and cattle, a combination woven wire and barb wire fence was constructed around the plot. In view of the joint experiments being carried on by this Office and the Experiment Station it was decided that the Experiment Station should furnish all of the materials and the Office of Blister Rust Control should supply the labor for construction of the fence.

a. Cost of Construction

(1) Labor	35 man days @ $ 3.07 1/7 per day	$ 107.50
(2) Subsistence	105 meals @ 0.3834	40.257
(3) Transportation of men to and from work		14.00
	Total cost	$ 161.76

2. Logging damage plot studies

During May, 1927, a sixteen-acre plot was established by the Forest Service on the Strawberry Timber Sale Area. The purpose of the plot was to study reproduction and damage conditions on an area after tractor logging and compare it with donkey logging. Data similar to

TABLE NO. 12

Post Last-Service Time per Acre by Types

Type	% recurrence	% result	Total
S.F.-Y.P. Mat.	1.85 ft.	89.04 ft.	91.17 ft
" Cut.	7.07 "	498.80 "	505.87 ft
S.P.-Mix Mat.	84.18 "	234.09 "	318.27 "
" Cut.	72.89 "	291.12 "	1,364.01 "
Straw Mat.	496.34 "	371.81 "	867.85 "
" Cut.	4,099.32 "	3,042.84 "	7,142.16 "

B. Cost of plot studies

a. Payroll $ 99.58

b. Subsistence 49.59¢ (111-meals @ $0.3584).

$148.07¢

C. Studies in Cooperation with California Forest Experiment Station

1. Cow Creek fencing job

In order to protect the Cow Creek study plot from damage by trespassing sheep and cattle, a combination woven wire and barb wire fence was constructed around the plot. In view of the joint experiments being carried on by this Office and the Experiment Station it was decided that the Experiment Station should furnish all of the materials and the Office of Silviculture Ranger Patrol should supply the labor for construction of the fence.

a. Cost of Construction

(1) Labor 25 man days @ $ 3.07 1/2 per day $ 127.50
(2) Subsistence 105 meals @ 0.38¢ 40.25¢
(3) Transportation of men to and from work 14.00
Total cost $ 181.75

2. Jointer damage plot studies

During May, 1927, a sixteen-acre plot was established by the Forest Service on the Strawberry Timber Sale Area. The purpose of the plot was to study reproduction and damage conditions on an area after tractor logging and compare it with donkey logging. Data similar to



W. 530. R. nevadense growing in granite rock outcropping.



W. 527. A typical situation in which R. cereum occurs.

those taken on the Cow Creek plot were obtained. The plot is located in S.P. - Y. P. type near the 1/4 corner of section 20 and 19. Practically all Ribes contained thereon are located along two intermittent streams crossing the plot. All Ribes were located and tagged for future reference. Examination will be made from time to time and a record kept all new Ribes.

A re-examination of the Cow Creek ten-acre damage study plot was also made. No new Ribes were found.

a. Cost

(1) Labor	15 days @ $3.10		$46.50
(2) Subsistence	45 meals @ $0.3834		17.25
		Total Cost	$63.75

D. Pre-eradication

1. Definition

Pre-eradication may be said to be a type of intensive reconnaissance furnishing data for the construction of operating plans and cost estimates on areas designated for Ribes eradication.

Prior to the close of the 1927 field season an area was chosen on which to continue, in 1928, the experimental Ribes eradication project. The area in the vicinity of Strawberry which has been the scene of activities for the past two seasons has been largely covered. Any additional work in the locality would be confined to a small project working on scattered areas, and would be a continuation of the same type cutover areas. It was felt that at least one season should be spent on experimental work in a stand of uncut sugar pine type of mixed age classes, that is, a representative stand of sugar pine, containing both sugar pine-yellow pine and sugar pine fir types in their typical all aged associations. The Ribes reconnaissance data of the Stanislaus Forest were consulted and an area of sixteen sections in the vicinity of Dorrington was selected as containing the necessary amount of uncut mature sugar pine type. A preliminary scouting trip was made to the proposed area and the results of this trip affirmed the belief that it possessed the necessary requisites for the experimental eradication project for 1928.

2. Location and description of area

The area lies in the north half of the Stanislaus Forest on the lower west slopes of the Sierra Nevadas about 27 miles above the town of Angels Camp, California. More exactly, it occupies the 16 sections centered

those taken on the Cow Creek plot were obtained. The plot is located in S.P. - Y. P. type near the I/4 corner of section 20 and 15. Practically all Ribes contained thereon are located along two intermittent streams crossing the plot. All Ribes were located and tagged for future reference. Examination will be made from time to time and a record kept all new Ribes.

A re-examination of the Cow Creek ten-acre damage study plot was also made. No new Ribes were found.

a. Cost

(1) Labor	15 days @ $3.10	$46.50
(2) Subsistence	45 meals @ $0.3834	17.25
Total Cost		$63.75

D. Pre-eradication

1. Definition

Pre-eradication may be said to be a type of intensive reconnaissance furnishing data for the construction of operating plans and cost estimates on areas designated for Ribes eradication.

Prior to the close of the 1927 field season an area was chosen on which to continue, in 1928, the experimental Ribes eradication project. The area in the vicinity of Strawberry which has been the scene of activities for the past two seasons has been largely covered. Any additional work in the locality would be confined to a small project working on scattered areas, and would be a continuation of the same type outover areas. It was felt that at least one season should be spent on experimental work in a stand of uncut sugar pine type of mixed age classes, that is, a representative stand of sugar pine, containing both sugar pine-yellow pine and sugar pine fir types in their typical all aged associations. The Ribes reconnaissance data of the Stanislaus Forest were consulted and an area of sixteen sections in the vicinity of Barrington was selected as containing the necessary amount of uncut mature sugar pine type. A preliminary scouting trip was made to the proposed area and the results of this trip affirmed the belief that it possessed the necessary requisites for the experimental eradication project for 1928.

2. Location and description of area

The area lies in the north half of the Stanislaus Forest on the lower west slopes of the Sierra Nevada about 27 miles above the town of Angels Camp, California. Lying directly, it occupies the [illegible]

around the intersection of T. 5 and 6 N. and R. 15 and 16 E. Mt. Diablo principal meridian. It is drained by the north fork of the Stanislaus River, San Antonio Creek, and their smaller tributaries. The area extends from the main divide between the south fork of the Mokelumne River and the north fork of the Stanislaus River, in the four townships mentioned above. This results in a general S. E. aspect. The area is characterized by gently rolling hills cut by the precipitous canyons of the Stanislaus River and San Antonio Creek. The elevation varies from 4,500 to 5,500 feet.

With the exception of two meadows of forty and fifty acres respectively the area is entirely timbered. Sugar pine is represented throughout the entire area in mixture with yellow pine, incense cedar, white fir (Abies concolor) and black oak (Quercus californica).

3. Methods of work

The eradication leader and two experienced assistants and the Ribes reconnaissance leader made up the pre-eradication force. Two-man parties were used. Each party was provided with F. S. compass, 2-chain topographic tape, Abney hand level and map sheets. After a day of general scouting in the locality to become familiar with the drainage, topography and timber types the actual delimiting of eradication types and traversing of the area was started. Starting from a known point each party would traverse ridges, streams and main roads. Tie-ins on section corners and 1/4 corners were made as often as possible. A party consisted of head and rear chainman. The head chainman ran the compass and checked the tallies. The rear chairman carried the traverse notes, took notes on working conditions pertaining to eradication, etc. and made type map sketches wherever necessary. Because of the fact that timber types are very largely controlled by ridges and streams, the actual bounding of such automatically resulted in a type map. A south facing slope will be a sugar pine-yellow pine type and a north facing slope will be a sugar pine-fir type. Thus a drainage map is also largely a timber type map. Small deviations in the general type because of secondary drainages, low saddles in ridges and openings in the stand as the result of fire or cutting make necessary a general survey of the area. After completing the traversing of ridges, streams and roads, strips were run across the type at various intervals and general working conditions, Ribes distribution and any type changes noted.

From these field data a map was constructed from which working plans and expenditure estimates will be made for the eradication project next year.

4. Results of work

A total of 10,542 acres were pre-eradicated. Of this total 9,349 acres is sugar pine-yellow pine type, 915 acres is sugar pine-fir type, 188 acres is stream type and 90 acres is meadow land, devoid of timber or Ribes. It required four men seven days to complete the job.

around the intersection of T. 5 and 6 N. and R. 15 and 16 E., Mt. Diablo principal meridian. It is drained by the north fork of the Stanislaus River, San Antonio Creek, and their smaller tributaries. The area extends from the main divide between the south fork of the Mokelumne River and the north fork of the Stanislaus River, in the four townships mentioned above. This results in a general S. E. aspect. The area is characterized by gently rolling hills cut by the precipitous canyons of the Stanislaus River and San Antonio Creek. The elevation varies from 4,800 to 5,800 feet.

With the exception of two meadows of forty and fifty acres respectively the area is entirely timbered. Sugar pine is represented throughout the entire area in mixture with yellow pine, incense cedar, white fir (Abies concolor) and black oak (Quercus californica).

3. Methods of work

The eradication leader and two experienced assistants and the Ribes reconnaissance leader made up the pre-eradication force. Two-man parties were used. Each party was provided with B. S. compass, 2-chain topographic tape, Abney hand level and map sheets. After a day of general scouting in the locality to become familiar with the drainage, topography and timber types the actual delimiting of eradication lines and traversing of the area was started. Starting from a known point each party would traverse ridges, streams and main roads. Tie-ins on section corners and 1/4 corners were made as often as possible. A party consisted of head and rear chainmen. The head chainman used the compass and checked the tallies. The rear chainman carried the traverse notes, took notes on working conditions pertaining to eradication, etc. and made type map sketches wherever necessary. Because of the fact that timber types are very largely controlled by ridges and streams, the actual bounding of each automatically resulted in a type map. A south facing slope will be a sugar pine-yellow pine type and a north facing slope will be a sugar pine-fir type. Thus a drainage may in large degree a timber type map. Small deviations in the general type because of secondary drainages, low saddles in ridges and openings in the stand as the result of fire or cutting make necessary a general survey of this area. After [illegible] letting the traversing of ridges, streams and roads, strips were run across the type at various intervals and general working conditions, Ribes distribution and any type changes noted.

From these field data a map was constructed from which working plans and expenditure estimates will be made for the eradication projects next year.

4. Results of work

A total of 10,586 acres were pre-eradicated. Of this total 9,349 acres is sugar pine-yellow pine type, 918 acres is sugar pine-fir type, 188 acres is stream type and 90 acres is meadow land, devoid of timber or Ribes. It required four men seven days to complete the job.

The area in general contains considerably fewer Ribes and represents easier working conditions than any area hitherto undertaken in California. The project will develop into largely a scouting job the chief problem being the development of a method or methods of cheaply and efficiently eradicating areas of relatively few Ribes.

5. Cost of pre-eradication

a. Labor	
(1) Supervision - - - - - - - -	$ 40.61
(2) Laborers - - - - - - - - -	108.27
b. Subsistence - - - - - - - - -	34.50
c. Transportation of men and equipment -	75.99
Total cost of job - - - - -	$ 259.67

Cost per acre - $0.024

A map of the eradication area showing in detail the location of all blocks and types accompanies this report. This map, on a scale of 4" to the mile also includes the 1926 eradication area.

VIII. Recommendations for 1928

A. The further development of a method of eradicating areas representing relatively easy working conditions and containing few Ribes as cheaply and efficiently as possible.

Since much of the uncut sugar pine stands in the commercial sugar pine belt represent relatively easy working conditions and contain few Ribes (in comparison to cutover areas) the development of a method of economically and efficiently eradicating such areas is of paramount importance.

The area selected for the 1928 experimental eradication project contains a large acreage of uncut sugar pine type and thus lends itself to the above experiment.

B. The development of a method of delimiting areas of no Ribes.

Often considerable areas containing no Ribes especially on south exposures occur. Any method of blocking out such areas will result in a material reduction in costs.

C. The further development of a two-man checking crew to systematically check the eradicated areas and carry on extensive experiments pertaining to checking work. At least 2 per cent of all stream type and 1 per cent of all other types should be checked. The following additional data should be secured:

1. Permanent advance study strips or plots on all types to study

The area in general contains considerably fewer Bibes and represents easier working conditions than any area hitherto undertaken in California. The project will develop into largely a scouting job the chief problem being the development of a method or methods of cheaply and efficiently eradicating areas of relatively few Bibes.

5. Cost of eradication

a. Labor

(1) Supervision - - - - - - - $ 40.83
(2) Laborers - - - - - - - - - 108.37
b. Subsistence - - - - - - - - - 54.50
c. Transportation of men and
equipment - - - - - - - - 75.89
Total cost of job - - - - - $ 279.59

Cost per acre - $0.094

A map of the eradication area showing in detail the location of all blocks and types accompanies this report. This map, on a scale of 4" to the mile also includes the 1926 eradication area.

VIII. Recommendations for 1928

A. The further development of a method of eradicating areas representing relatively easy working conditions and containing few Bibes as cheaply and efficiently as possible.

Since much of the worst sugar pine stands in the commercial sugar pine belt represent relatively easy working conditions and contain few Ribes (in comparison to cutover areas) the development of a method of economically and efficiently eradicating such areas is of paramount importance.

The area selected for the 1928 experimental eradication project contains a large acreage of worst sugar pine type and thus lends itself to the above experiment.

B. The development of a method of [illegible] area of no Ribes

Often considerable areas containing no Ribes especially on south exposures occur. Any method of blocking out such areas will result in a material reduction in costs.

C. The further development of a two-man clearing crew to systematically check the eradicated areas and carry on extensive experiments pertaining to checking work. At least 2 per cent of all stream type and 1 per cent of all other types should be checked. The following additional data should be secured:

1. Permanent advance study strips on plots on all types to study

Ribes re-establishment. The effect of exposure upon Ribes growth and re-establishment.

2. The gathering of additional leaf bearing stem data for both species of Ribes on all slopes.
3. The computation of checking data in the field, immediately following the completion of a block. Such information will assist the camp boss in judging the class of work being done and enable him to regulate the work accordingly.
4. The checking of the check-strips to determine efficiency of checking job.

D. The following methods experiments should be undertaken:

1. Size of scout crew best suited to conditions prevailing in uncut sugar pine areas.
2. Size of crew and method of procedure in eradicating the narrow stream type prevailing on many of the smaller streams on the area.
3. The use of different types of tools such as mattock for stream type, Nimman pick and various other special tools for use on upland areas, etc.
4. The use of grocier's twine or compass line for guide trail in scout eradication.
5. How fast can a crew travel and do efficient work?

E. The purchase of a light truck of 3/4 or one ton capacity for use in hauling supplies, equipment and men. Because of the scarcity of water, camp cannot be always ideally situated and to facilitate getting men to and from work, a truck is necessary. Numerous roads make the use of a truck permissable.

F. The use of spindles of 2-lb. 3-ply white grocer's twine for guide trail in all areas requiring guide trail.

G. The development and use of a metal block boundary marker, conspicuously colored and marked so as to be readily visible and distinguishable; such tags to do away with the practice of blazing trees.

ribes re-establishment. The effect of exposure upon ribes
growth and re-establishment.
2. The gathering of additional leaf bearing stem data for both species of ribes on all slopes.
3. The computation of checking data in the field, immediately following the completion of a block. Such information will assist the camp boss in judging the class of work being done and enable him to regulate the work accordingly.
4. The standardization of the slide-rule to determine efficiency of cruising jobs.

D. The following methods should be adopted in marking out:

1. Size of scout crew best suited to road-line prevailing in worst sugar pine areas.
2. Size of crew and method of procedure in eradicating the narrow strips type prevailing on many of the smaller streams on the area.
3. The use of different types of tools such as mattock for stream type, timber pick and various other special tools for use on upland areas, etc.
4. The use of Brocier's twine or compass line for guide trail in scout operations.
5. Type test can a crew travel and do efficient work?

E. The purchase of a light truck of 3/4 or one ton capacity for use in hauling supplies, equipment and men. Because of the scarcity of water, camp cannot be always ideally situated and to facilitate getting men to and from work, a truck is necessary. Numerous roads make the use of a truck permissable.

F. The use of spindles of 2-ply white grocer's twine for guide trail in all areas requiring guide trail.

G. The development and use of a metal blaze terminal, conspicuously colored and marked so as to be readily visible and distinguishable; such tags to do away with the practice of blazing trees.

SUPPLEMENT TO M'ALLICATION REPORT

Sugar Pine and Ribes Conditions on the National Forests of California

The following dissertation is the outgrowth of a recent scouting trip through the commercial sugar pine region of California. The main objective of the trip was to gain a more comprehensive idea of the problems confronting the forester in protecting the sugar pine from blister rust. The sugar pine region from the Pacific coast to Nevada and from the northern part of the state south to the southern end of the Sierra Nevada was covered. This included eleven national forests and two national parks as well as considerable interspersed private holdings. Going from the dense stands of redwood forests of the coast to the barren rocky lands of the eastern slope of the Sierra Nevada, afforded an exceptional opportunity to distinguish the many varying conditions and associations in which sugar pine occurs in California. Because of the many diversifications existing in a section of this size each national forest will be taken up separately.

Trinity National Forest

The Trinity National Forest was first. While sugar pine grows on the California National Forest south of the Trinity, it is very scattering and of minor commercial importance.

Proceeding west from Redding the journey was through the typical patchy brush and barren rocky lands of an east slope type. No Ribes were noted here. As a higher elevation was reached digger pine and scrub oak formed an over-story of the brush with an occasional straggling yellow pine. The south slopes were covered with sage brush. Along the streams there were a few Ribes (G. klamathensis). Above the digger pine - oak type appeared the yellow pine, mixed with incense cedar, Douglas fir and an occasional sugar pine. Several species of Ribes were observed in the yellow pine type, expecially near the streams, but in no great amounts. G. cruenta grew in the rocks throughout the open pine stands. Near the summit of the coast range and over to the Douglas fir type along the west slopes, the sugar pine was most prominent but not in commercial quantities. The yellow pine gave way to Douglas fir near the summit and on the west facing slopes nearly pure fir stands were found with some sugar pine interspersed. Along these slopes there were several species of gooseberries, G. cruenta, G. lobbii and G. klamathensis and one currant, R. sanguineum. This type prevailed up to the inner fringe of the fog belt where redwood and Douglas fir, with some hemlock and sitka spruce formed the forest type. There was no sugar pine in this type. R. sanguineum and G. divaricata were noted in the fields near the coast.

It is a question whether sugar pine is of sufficient importance on this forest to protect. There does not seem to be any well defined sugar pine type, the tree occurring scattered over a large area.

Sugar Pine and Other Conditions on the National Forests of California

The following discussion is the outgrowth of a recent scouting trip through the commercial sugar pine region of California. The main objective of the trip was to gain a more comprehensive idea of the problems confronting the forester in protecting the sugar pine from blister rust. The sugar pine region from the Pacific coast to Nevada and from the northern part of the state south to the southern end of the Sierra Nevada was covered. This included eleven national forests and two national parks as well as considerable interspersed private holdings. Going from the dense stands of redwood forests of the coast to the barren rocky lands of the eastern slope of the Sierra Nevada, afforded an exceptional opportunity to distinguish the many varying conditions and associations in which sugar pine occurs in California. Because of the many diversifications existing in a section of this size each national forest will be taken up separately.

Trinity National Forest

The Trinity National Forest was first. While sugar pine grows on the California National Forest south of the Trinity, it is very scattering and of minor commercial importance.

Proceeding west from Redding the journey was through the typical patchy brush and barren rocky lands of an east slope type. No Ribes were noted here. As a higher elevation was reached digger pine and scrub oak formed an over-story of the brush with an occasional straggling yellow pine. The south slopes were covered with sage brush. Along the stream there were a few Ribes (*R. klamathense*). Above the digger pine - oak type appeared the yellow pine, mixed with incense cedar, Douglas fir and an occasional sugar pine. Several species of Ribes were observed in the yellow pine type, especially near the streams, but in no great amounts. *R. cruenta* grew in the rocks throughout the open pine stands. Near the summit of the next range and over to the Douglas fir type along the west slope, the sugar pine was most prominent but not in commercial quantities. The yellow pine gave way to Douglas fir near the summit and on the west facing slopes nearly pure fir stands were found with some sugar pine interspersed. Along these slopes there were several species of gooseberries, *R. cruenta*, *R. lobbii* and *R. klamathensis* and one currant, *R. sanguineum*. This type prevailed up to the inner fringe of the fog belt where redwood and Douglas fir, with some hemlock and sitka spruce formed the forest type. There was no sugar pine in this type. *R. sanguineum* and *R. divaricata* were noted in the fields near the coast.

It is a question whether sugar pine is of sufficient importance on this forest to protest. There does not seem to be any well defined sugar pine type, the trees occurring scattered over a large area.

Klamath National Forest

The Klamath Forest lay adjacent to and just north of the Trinity. In general it may be characterized as a rugged, irregular, inaccessible, mountainous region. The forest types were similar to those of the Trinity.

Along the coast were the dense redwood forests, with hemlock and sitka spruce as secondary species. Thick undergrowth grew throughout the type. A few bushes of R. bracteosum were seen along streams near the coast. The trip eastward from the coast over the only roadway, the Klamath River Highway, was a long arduous journey. Little of the surrounding country could be seen as the road followed the Klamath River Canyon across the forest. Sugar pine appeared to be quite prevalent on both slopes of the river and along the side drainages, with Douglas fir on the western part of the forest and with yellow pine towards the east. From the yellow pine type the journey was through the dry open juniper, sage brush areas of north central California. Ribes were abundant all along the river in the timbered region with several species of gooseberries in evidence. They were of such size and type as to require tool eradication. Should eradication be carried on in this region it would be a difficult and expensive undertaking and it is doubtful if the sugar pine would support the burden. Local control on the best sugar pine localities might be feasible.

Shasta National Forest

This forest has been largely logged and burned. The burned areas were covered with a dense growth of brush, chiefly manzanita and several species of Ceanothus. There was very little coniferous reproduction on these areas. Some of the cutover lands were coming back with good stands of conifers, principally yellow pine on the south and west slopes and Douglas fir and sugar pine on the north and east. Sugar pine occurred with the yellow pine but not in such quantities as with the fir. The cutover lands also ran heavily to brush. G. roezli and G. sp? were growing in large numbers in the brush patches on both burned and logged areas and R. nevadense was prevalent along the streams. The Shasta Forest is for the most part a series of rolling hills, rendered fairly accessible by a network of roads. Interepersed with the government land were extensive areas of private holdings, for the most part cutover, but containing good sugar pine reproduction.

Lassen National Forest

The Lassen Forest is largely a mountain plateau of gently rolling hills, broken up by many grassy meadows. The only sugar pine noted on the Lassen was in the vicinity of Susanville and Lake Almanor where sugar pine was well represented in the reproduction on the cutover areas. G. roezli occurred throughout the cutover areas. The eastern

Klamath National Forest

The Klamath Forest lay adjacent to and just north of the Trinity. In general it may be characterized as a rugged, irregular, inaccessible, mountainous region. The forest types were similar to those of the Trinity.

Along the coast were the dense redwood forests, with hemlock and sitka spruce as secondary species. Thick undergrowth grew throughout the type. A few bunches of R. bracteosum were seen along stream near the coast. The trail ran inland from the coast over the only roadway, the Klamath River Highway, was a long arduous journey. Little of the surrounding country could be seen as the road followed the Klamath River Canyon across the forest. Sugar pine appeared to be quite prevalent on both slopes of the river and along the side drainages, with Douglas fir on the western part of the forest and with yellow pine towards the east. From the yellow pine type the journey was through the dry open timber, sage brush areas of north central California. Ribes were abundant all along the river in the timbered region with several species of preservative in evidence. They were of such size and type as to require local eradication. Should eradication be carried on in this region it would be a difficult and expensive undertaking and it is doubtful if the sugar pine would support the burden. Local control on the best sugar pine localities might be feasible.

Shasta National Forest

This forest has been largely logged and burned. The burned areas were covered with a dense growth of brush, chiefly manzanita and several species of Ceanothus. There was very little coniferous reproduction on these areas. Some of the cutover lands were coming back with good stands of conifers, principally yellow pine on the south and west slopes and Douglas fir and sugar pine on the north and east. Sugar pine occurred with the yellow pine but not in such quantities as with the fir. The cutover lands also ran heavily to brush. R. repali and R. sp? were growing in large numbers in the brush patches on both burned and logged areas and R. nevadense was prevalent along the streams. The Shasta Forest is for the most part a series of rolling hills, rendered fairly accessible by a network of roads. Interspersed with the government land were extensive areas of private holdings, for the most part cutover, but containing good sugar pine reproduction.

Lassen National Forest

The Lassen Forest is largely a mountain plateau of rolling hills, broken up by many grassy meadows. The only sugar pine noted on the Lassen was in the vicinity of Susanville and Lake Almanor where sugar pine was well represented in the reproduction on the cutover areas. R. roezlii occurred through out the cutover areas. The western

part of the forest was a large flat of practically pure mature yellow pine.

Eradication on the sugar pine areas of the Lassen should not be difficult because of the rolling nature of the country and its accessibility.

Plumas National Forest

It was just after leaving Lake Almanor on the Plumas Forest that the first good mature sugar pine timber was reached--a sugar pine-fir (Douglas) type with sugar pine well represented. The Ribes, C. roezli, G. inermis and R. nevadense were also numerous. Good sugar pine extended into Quincy.

In the vicinity of the Feather River Experiment Station on Butter Fly Creek drainage, an area of some 12,000 acres of sugar pine type was scouted as a possible experimental eradication area. This area is destined to be used as an experimental logging area by the Forest Service and is to be managed on a sustained yield basis. Sugar pine, Douglas fir and yellow pine were the chief timber species present with some white fir and incense cedar. Three Ribes species were noted: G. roezli, the most numerous species and G. inermis and R. nevadense along the streams. The area, which was within six miles of Quincy, the headquarters of the Plumas Forest, was connected by a good macadam road. The topography varied from rolling hills to the precipitous canyons of the Feather River. The elevation varied from 3,000 to 4,500 feet.

From Quincy to the Tahoe Forest the journey was largely through cutover lands, coming in mostly to yellow pine with a fair representation of sugar pine.

Tahoe National Forest and Eldorado National Forest

The journey on the Tahoe was through yellow pine, Jeffrey pine, and lodgepole pine, somewhat above the altitudinal range of sugar pine. Ribes cereum was numerous along the slopes and ridges. Near Lake Tahoe in the streams flowing into the lake G. inermis was abundant appearing in heavy concentrations in some stream bottoms. A few scattered sugar pine were found in the red fir type around the lake.

The trip from Tahoe across the Kingsbury Grade onto the east slope of the Sierra Nevada was through the open rocky hills, with patches of pinon pine and juniper. Along this dry slope was a well established infection of pinon blister rust (C. occidentale), a closely related species to white pine blister rust. Both the pine (P. monophylla) and

part of the forest was a large flat of practically pure mature yellow pine.

Prediction on the sugar pine areas of the Tahoe can not be difficult because of the rolling nature of the country and its accessibility.

Plumas National Forest

It was just after leaving Lake Almanor on the Plumas Forest that the first good mature sugar pine timber was reached--a sugar pine-fir (Douglas) type with sugar pine well represented. The Pines, P. ponderosa, P. Jeffreyi, Incense and P. Lambertiana were also numerous. Good sugar pine extended into Quincy.

In the vicinity of the Feather River Experiment Station on Butter Fly Creek drainage, an area of some 12,000 acres of sugar pine type was counted as a possible experimental eradication area. This area is destined to be used as an experimental logging area by the Forest Service and is to be managed on a sustained yield basis. Sugar pine, Douglas fir and yellow pine were the chief timber species present with some white fir and Incense cedar. Three Pines species were noted: P. ponderosa, the most numerous species and P. Jeffreyi and P. Lambertiana along the streams. The area, which was within six miles of Quincy, the headquarters of the Plumas Forest, was connected by a good macadam road. The topography varied from rolling hills to the precipitous canyons of the Feather River. The elevation varied from 3,000 to 4,500 feet.

From Quincy to the Tahoe Forest, the journey was largely through cutover lands, coming in mostly to yellow pine with a fair representation of sugar pine.

Tahoe National Forest and Eldorado National Forest

The journey on the Tahoe was through yellow pine, Jeffrey pine, and lodgepole pine, somewhat above the altitudinal range of sugar pine. Pines ponderosa was numerous along the slopes and ridges. Near Lake Tahoe in the streams flowing into the lake P. Jeffreyi was abundant appearing in heavy concentrations in some stream bottoms. A few scattered sugar pine were found in the red fir type around the lake.

The trip from Tahoe crosses the Kingsbury Grade onto the east slope of the Sierra Nevada was through the open rocky hills, with patches of pinon pine and juniper. Along this dry slope was well established infection of pinon blister rust (C. occidentale), a closely related species to white pine blister rust. With the pine (P. monophylla) and

Ribes (G. velutina) were infected. There are those who believe blister rust will not become established in California because of the long dry summers with no precipitation. One has only to note the pinon rust here to disprove this idea. Infection on Ribes many miles from the nearest pinon pine was common.

Mono National Forest

This forest is chiefly a grazing forest, the only timber being patches of pinon pine and juniper, with some Jeffrey pine and red fir along the streams. R. montigenum and G. lasiantha were found near the summit of the Levining Grade. G. velutina grew on the dry rocky hillsides over the entire forest.

Yosemite National Park and Stanislaus National Forest

Along Tioga Pass and Tenaya Lake near the summit there was considerable white pine (P. monticola) and some white bark pine (P. albicaulis) although the principal timber species were lodgepole pine and red fir. Mountain hemlock was also present. R. montigenum and R. cereum were the chief Ribes species, with an occasional R. nevadense. Lower down sugar pine came in the stand with red fir, and as the elevation decreased the red fir gave way to white fir and sugar pine increased. G. roezli and R. nevadense with a few R. hallii and R. cereum constitute the Ribes flora of this region.

The best sugar pine seen on the entire trip was in Yosemite Park and the Stanislaus Forest around Carl Inn. Here sugar pine grew in as nearly a pure stand as is ever found, becoming the chief tree in the stand along with white fir and incense cedar. There were also extensive private holdings of excellent sugar pine in this locality. Ribes were not numerous. G. roezli and R. nevadense were the species present. The topography is rugged and steep. Good sugar pine was found on the southern part of the Yosemite Valley mixed with white fir and incense cedar.

Sierra National Forest

The Sierra Forest is quite comparable to the Stanislaus although the sugar pine probably is not as prevalent. Much of the sugar pine area had been logged, and is coming back in about the same proportion as originally timbered the area. Manzanita and Ceanothus were the principal brush species with considerable G. roezli intermixed. R. nevadense prevailed along the streams. Near Huntington Lake solid acres of pure R. cereum occurred at an elevation of 7,000 feet. These concentrations did not seem to enter the sugar pine type.

Ribes (G. velutina) were infected. There are those who believe blister rust will not become established in California because of the long dry summers with no precipitation. One has only to note the pinon rust here to disprove this idea. Infection on Ribes many miles from the nearest pinon pine was common.

Mono National Forest

This forest is chiefly a grazing forest, the only timber being patches of pinon pine and juniper, with some Jeffrey pine and red fir along the streams. I. monticola and G. lasiantha were found near the summit of the Devil's Peads. G. velutina grew on the dry rocky hillsides over the entire forest.

Yosemite National Park and Stanislaus National Forest

Ribes ribes Pree and Tenuis (or near the result there was considerable white pine (P. monticola) and some white fir pine (A. albicaulis) although the principal timber species were Jeffrey pine and red fir. Mountain hemlock was also present. I. monticola and R. cereum were the chief Ribes species, with an occasional R. roezlii. Lower down sugar pine came in the stand with red fir, and as the elevation decreased the red fir gave way to white fir and sugar pine increased. G. roezlii and R. nevadense with a few R. bailii and R. cereum constitute the Ribes flora of this region.

The best sugar pine seen on the entire trip was in Yosemite Park and the Stanislaus Forest around Carl Inn. Here sugar pine grew in as nearly a pure stand as is ever found, becoming the chief tree in the stand along with white fir and incense cedar. There were also extensive private holdings of excellent sugar pine in this locality. Ribes were not numerous. G. roezlii and R. nevadense were the species present. The topography is rugged and steep. Good sugar pine was found on the southern part of the Yosemite Valley mixed with white fir and incense cedar.

Sierra National Forest

The Sierra Forest is quite comparable to the Stanislaus although the sugar pine probably is not as prevalent. Much of the sugar pine area had been logged, and is coming back in what the same proportion as originally timbered the area. Mannanita and Ceanothus were the principal brush species with considerable G. roezlii interfixed. R. nevadense prevailed along the entire me. West Millington Lake solid across of pure R. cereum occurred at an elevation of 7,000 feet. These conservations did not seem to enter the sugar pine type.

Sequoia National Forest and General Grant National Park

A large portion of the Sequoia Forest lies in the brush and digger pine-scrub oak types. Timber line was noticeably higher on the Sierra and Sequoia Forests than on the northern forests. The timber and Ribes conditions were much the same on the Sequoia as on the Sierra and Stanislaus. There was good sugar pine and giant Sequoia reproduction just outside General Grant National Park. The park itself contained excellent sugar pine in association with the big trees. The General Grant National Park inspection completed the trip.

Blister rust control in California took on a different aspect after the completion of the scouting trip. Some of the outstanding impressions and observations of the trip are:

(1) Over a large part of its so-called commercial range sugar pine is very scattered and inconspicuous in the stand.

(2) A large part of the best sugar pine has been logged, both on private holdings and on the National forests. The best virgin stands of sugar pine within the forest boundaries are privately owned. One can almost classify the timber as to private or Government from its quality and quantity, the private holder practically in every case getting the best.

(3) Sugar pine while not limited to any slope, occurs principally on north and east slopes and the sugar pine fir types contain more and better sugar pine than do the sugar pine-yellow pine types. However, in its higher altitudinal range, sugar pine swings over on to the south and west slopes, in mixture with yellow pine and Jeffrey pine. In the lower altitudinal range of sugar pine on the sugar pine-yellow pine types, the yellow pine is by far the outstanding tree in the type, in fact, it is difficult in many cases to distinguish a sugar pine type. However, Ribes are generally so few on such types as to render protection merely a matter of a few cents per acre.

(4) In the northern part of its range, on the moist slopes, sugar pine occurs principally with Douglas fir. To the southward the Douglas fir gives way to white fir, and on the southern forests little Douglas fir is seen.

(5) On the cutover lands the sugar pine reproduction is not very conspicuous. This is largely due to the characteristic slow juvenile

Sequoia Letter I Yarrel and General Grant National Park

A large portion of the Sequoia Forest lies in the brush and digger pine-scrub oak types. Timber line was noticeably higher on the Sierra and Sequoia Forests than on the northern forests. The timber and Ribes conditions were much the same on the Sequoia as on the Sierra and Stanislaus. There was good sugar pine and giant Sequoia reproduction just outside General Grant National Park. The park itself contained excellent sugar pine in association with the big trees. The General Grant National Park inspection completed the trip.

Miester rust control in California took on a different aspect after the completion of the scouting trip. Some of the outstanding impressions and observations of the trip are:

(1) Over a large part of its so-called commercial range sugar pine is very scattered and incomplete in the stand.

(2) A large part of the best sugar pine has been logged, both on private holdings and on the National Forests. The best virgin stands of sugar pine within the Forest boundaries are privately owned. One can almost classify the timber as to private or Government from its quality and quantity; the private holder practically in every case getting the best.

(3) Sugar pine while not limited to any slope, occurs principally on north and east slopes and the sugar pine fir type contain more and better sugar pine than do the sugar pine-yellow pine types. However, in the higher altitudinal range, sugar pine swings over on to the south and west slopes, in mixture with yellow pine and Jeffrey pine. In the lower altitudinal range of sugar pine on the sugar pine-yellow pine types, the yellow pine is by far the outstanding tree in the type, in fact, it is difficult in many cases to distinguish a sugar pine type. However, these are generally so few on each type as to render protection merely a matter of a few cents per acre.

(4) In the northern part of its range, on the moist slopes, sugar pine occurs principally with Douglas fir. To the southward the Douglas fir gives way to white fir, and on the southern forests little Douglas fir is seen.

(5) On the cutover lands the sugar pine reproduction is not very complete. This is largely due to the characteristic slow juvenile

growth of the sugar pine, but can partly be accounted for by the poor reproductive qualities of the species.

Note: The present year seems to be a good seed year for sugar pine over its entire range.

(6) In several localities where yellow pine is the principal tree cut, but where sugar pine appears in the type, it is milled and graded along with yellow pine and sold under the trade name of "California White Pine."

(7) The best sugar pine noted on the trip was on the Stanislaus Forest and Yosemite Park in the vicinity of Carl Inn. Here sugar pine in its association with white fir and incense cedar becomes the chief tree of the stand.

(8) The site condition occupied by the giant Sequoia seems to be especially suited to sugar pine for it is in the big tree groves that sugar pine attains its largest size and greatest density. Here sugar pine is a magnificent tree but its large and massive proportions are rendered negligible by the overtowering Sequoios.

(9) Numerous Ribes species inhabit the sugar pine region but the only two of outstanding importance are G. roezli and R. nevadense. In local areas R. cereum works down from the higher elevations and becomes quite numerous in the upper sugar pine type and in the north G. inermis is dense along certain streams and G. cruenta shows up in old burns and cutover areas but the two species to contend with in eradication are G. roezli and R. nevadense.

There are probably large areas of the sugar pine type that it will never pay to protect. The scattered sugar pine occurring on the type would not support the burden. There are, however, areas within the optimum range of sugar pine where the tree grows in a well defined type and is of sufficient quantity and value to support a protection charge. Just where the line comes between the two extremes only experimental work will disclose.

Later: The present year seems to be a good seed year for sugar pine over its entire range.

(6) In several localities where yellow pine is the principal tree cut, but where sugar pine appears in the type, it is milled and graded along with yellow pine and sold under the trade name of "California White Pine."

(7) The best sugar pine noted on the trip was on the Shasta-Lassen forest and Yosemite Park in the vicinity of Dart Inn. Here sugar pine in its association with white fir and incense cedar becomes the chief tree of the stand.

(8) The site condition occupied by the giant Sequoia seems to be especially suited to sugar pine for it is in the big tree groves that sugar pine attains its largest size and greatest density. Here sugar pine is a magnificent tree but its large and massive proportions are rendered negligible by the overtowering Sequoias.

(9) Numerous minor species inhabit the sugar pine region but the only two of outstanding importance are G. vosaii and B. nevadense. In local areas B. coreum works down from the higher elevations and becomes quite numerous in the upper sugar pine type and in the north G. inermis is dense along certain streams and G. ornata shows up in old burns and cutover areas but the two species to contend with in eradication are G. vosaii and B. nevadense.

There are probably large areas of the sugar pine type that it will never pay to protect. The scattered sugar pine occurring on the type would not support the burden. There are, however, areas within the optimum range of sugar pine where the trees grows in a well defined type and is of sufficient quantity and value to support a protection charge. Just where the line comes between the two extremes only experimental work will disclose.

QUARANTINE INSPECTION

by

C. R. Stillinger
Associate Pathologist

I. Introduction

Quarantine inspection in the West during the year has been handled according to the established policy of cooperation between the Office of Blister Rust Control and the Federal Horticultural Board. During the inspection season employees of this office have been deputized as Federal Board inspectors. These men have worked under the direct supervision of the project leader. All correspondence regarding the violations has been conducted by the project leader and the case sent to the Washington offices when all correspondence regarding it had been completed.

II. Purpose

The purpose of this project is to inspect plants moved out of quarantined areas in order to detect and stop violations of the blister rust quarantine.

III. Summary of Results

A. Changes in Regulations

The regulations in effect have been those of Federal Quarantine 63 passed on October 1, 1926, as amended effective March 15, 1927. This amendment made three changes in the quarantine:

1. Provision is made for the control area permit to be issued by a Federal instead of a state inspector.

2. Provision is made so that control area regulations may be made to apply to a whole state if that state makes the control area regulations apply to the entire state with reference to a particular species of Ribes.

3. The date of inspection of particular plants is the date when these particular plants were inspected rather than that when a particular nursery was inspected.

Changes in state regulations under Federal Quarantine 63 have consisted in the establishment of a control area in the State of Idaho known as Idaho State Quarantine No. 10 and the amendment of Quarantine No. 18 now No. 5 of the State of Oregon adding to the infected area the counties of Multnomah, Clackamas, Hood River and Wasco.

QUARANTINE INSPECTION

by

G. R. Stillinger
Associate Pathologist

I. Introduction

Quarantine inspection in the West during the year has been handled according to the established policy of cooperation between the Office of Blister Rust Control and the Federal Horticultural Board. During the inspection season employees of this office have been deputized as Federal Board inspectors. These men have worked under the direct supervision of the project leader. All correspondence regarding the violations has been conducted by the project leader and the case sent to the Washington office when all correspondence regarding it had been completed.

II. Purpose

The purpose of this project is to inspect plants moved out of quarantined areas in order to detect and stop violations of the blister rust quarantine.

III. Summary of Results

A. Changes in Regulations

The regulations in effect have been those of Federal Quarantine 65 revised on October 1, 1926, as amended effective March 15, 1927. This amendment made three changes in the quarantine:

1. Provision is made for the control area permit to be issued by a Federal instead of a state inspector.

2. Provision is made so that control area regulations may be made to apply to a whole state if that state makes the control area regulations apply to the entire state with reference to a particular species of Ribes.

3. The date of inspection of particular plants is the date when these particular plants were inspected rather than that when a particular nursery was inspected.

Changes in state regulations under Federal Quarantine 65 have consisted in the establishment of a control area in the State of Idaho known as Idaho State Quarantine No. 10 and the amendment of Quarantine No. 18 now No. 5 of the State of Oregon adding to the infected area the counties of Multnomah, Clackamas, Wood River and Wasco.

During the season Canada has revised her blister rust quarantine in such a way as to affect the American shippers. All standard varieties of red and white currants and gooseberries which are grown for their fruit are now allowed free importation into Canada.

B. Phases of the Work

During the past year the three types of problems which have been engaged in under this project are as follows: (1) The inspection of plant shipments moving by mail, express and freight; (2) Inspection of automobiles at bridges and ferries crossing the Columbia River between Washington and Oregon; (3) Christmas tree shipments from the Pacific coast region to other states.

1. Inspection of parcel post, express and freight.

a. Location

Inspection work of this type was done at Seattle, Tacoma and Spokane, Washington; Portland and Pendleton, Oregon; Pocatello, Idaho and Ogden, Utah.

b. Results

The four following tables give a summary of this phase of the work for the spring and fall shipping seasons.

During the season Canada has revised her pilot rule quarantine in such a way as to affect the American shippers. All standard varieties of red and white currants and gooseberries which are grown for their fruit are now allowed free importation into Canada.

1. Phase of the Work

During the past year the three types of problems which have been engaged in under this project are as follows: (1) The inspection of plant shipments moving by mail, express and freight; (2) Inspection of automobiles at bridges and ferries crossing the Columbia River between Washington and Oregon; (3) Driftwood trees shipments from the Pacific coast region to other states.

a. Inspection of mail, express and freight.

a. Location

Inspection work of this type was done at Seattle, Tacoma and Spokane, Washington; Portland and Pendleton, Oregon; Pocatello, Idaho and Ogden, Utah.

b. Results

The four following tables give a summary of this phase of the work for the spring and fall shipping seasons.

TABLE NO. 1

Plant Shipments Inspected
Spring - 1927

Inspection Point	Period of Inspection	No. Ribes or Pine Shpts. from Eastern Quar. Zone	Western Quar. Zone	Not Quar. Zone	Number Inspected	Number Not Inspected	Number of Violations State	Federal	Shipments Reported to States	Number Loose Parcel Post
				P A R C E L P O S T						
Ogden	3/12/27-4/24	70	39	144	359	25		1		195
Pocatello	4/8/27-5/15			71	463				64	445
Pendleton	3/1/27-5/11				842	61			3	
Tacoma	2/21/27-5/12		4	5	2,058			3	434	863
Portland	2/11/27-5/2		1		2,893			3		
Seattle	10/1/26-5/21	1	53	5	13,899		20	12	138	6,830
Spokane	2/2/27-5/21			2	13,513		2	7		4,417
Total		71	97	227	34,022	86	22	26	689	12,750
				E X P R E S S						
Ogden	3/12/27-4/24	216	60	199	375	114			3	2
Pocatello	4/8/27-5/15	2		71	1,381	8		1	599	
Pendleton	3/1/27-5/11				2,164	3			772	
Tacoma	2/21/27-5/12			10	557				66	
Portland	2/11/27-5/2				1,864					
Seattle	10/1/26-5/21	1	24		2,172		3	1	105	
Spokane	2/2/27-5/21	2	2		2,976			1		
Total		221	86	280	11,492	125	3	3	1,575	2
				F R E I G H T						
Ogden	3/12/27-4/24									
Pocatello	4/8/27-5/15				32	9			13	
Pendleton	3/1/27-5/11				42	9			34	
Tacoma	2/21/27-5/12									
Portland	2/11/27-5/2				225					
Seattle	10/1/26-5/21				78*	4			10	
Spokane	2/2/27-5/21				150					
Total					427	22			57	

* and 1 car

TABLE NO. 1

Plant Shipments Inspected
Spring - 1927

Inspection Point	Period of Inspection	No. Cases or Pine Shoots. Term. Canisters Quar. Cans	Tenders Quar. Cans	Not Quar. Cans	Number Inspected	Number Not Inspected	Number of Violations Labels	Number of Violations Improper	Shipments Reported	Number Loose Parcel Post
				F A I R O A K S						
Ogden	3/15/27-4/24	70	39	144	253	25		1		145
Pocatello	4/8/27-5/15			71	462				64	442
Pendleton	3/1/27-5/11				842	81			2	
Tacoma	3/21/27-5/12		4	5	2,028			3	474	883
Portland	3/11/27-5/3		1		2,238			4		
Seattle	10/1/26-5/31	1	82	5	11,899		70	12	138	6,507
Spokane	2/3/27-5/11			1	36,714		3	7		4,417
Total		71	47	227	54,028	26	22	28	689	12,760
				L Y N D E N						
Ogden	3/15/27-4/24	316	60	150	1274	114			3	2
Pocatello	4/8/27-5/15	2		71	1,281	4		1	320	
Pendleton	3/1/27-5/11				2,164	2			176	
Tacoma	3/21/27-5/12			10	852				65	
Portland	3/11/27-5/2				1,854					
Seattle	10/1/26-5/31	1	34		2,172		3	1	105	
Spokane	2/3/27-5/11	2	2		2,372			1		
Total		321	96	230	11,888	120	3	2	1,272	2
				P R I N E V I L L E						
Ogden	3/15/27-4/24									
Pocatello	4/8/27-5/15				82	9			12	
Pendleton	3/1/27-5/11				62	9			24	
Tacoma	3/21/27-5/12									
Portland	3/11/27-5/2				2,5					
Seattle	10/1/26-5/31				1,2	4			10	

TABLE NO. 2

Quarantine Violations
Spring - 1927

Shipper	Transporting Agency	Federal Quarantine 63						State Quarantine 7, 12, 13					
		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine	
		No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants
Nursery	Parcel Post			4	70					5	61		
	Express			2	7					1	7		
Individual	Parcel Post			20	139	2	3			16	142	1	12
	Express			1	5					2	24		
Total				27	221	2	3			24	234	1	12

Irregularities:

(1) Oscar H. Will & Company, Bismark, N. D.
7 currants & gooseberries, Express,
Contents not listed.

(2) Ideal Nursery, Sumner, Washington
15 currants 15 gooseberries, Parcel Post,
Obsolete inspection tag used in error.

Violations Federal Quarantine 63 = 29 (2 pine)
Violations State Quarantine 7, 12, 13 = 25 (1 pine)
54 (3 pine)

Ribes shipments = 51 shipments 455 plants
Pine shipments = 3 shipments 15 plants
54 shipments 470 plants

Violations of Federal Quarantine by nurserymen = 6
Violations of Federal Quarantine by individuals=23

TABLE NO. 3

Operating Violations
Spring - 1957 Period

Level	Industrial Wastes				Sewage Treatment Plants				Surface Waters			
	Process Waters		Cooling Waters		Primary Treatment		Secondary Treatment		Recreational Waters		Water Supplies	
	Percent Tests	No. Violations	Percent Tests	No. Violations	Percent Tests	No. Violations	Percent Tests	No. Violations	Percent Tests	No. Violations	Percent Tests	No. Violations
Industrial Discharges												
Municipal Discharges												
Tributaries	12	1	12	1								
Streams	12	1	12	1								
Estuary	24	2	24	2	24	2	24	2	24	2	24	2
Bay	24	2	24	2	24	2	24	2	24	2	24	2
Ocean	24	2	24	2	24	2	24	2	24	2	24	2
Totals	96	8	96	8	72	6	72	6	72	6	72	6

Treatment Plants:

(1) Ocean City & Somers Point Sewerage Co. (2) Ideal Manor, Shamong Sanitary Co.

Ocean City - Somers Point, Bayshore Sewerage Co.

Ocean City - Upper Township, Marmora Sewerage Co.

Violations Federal Operating Criteria: Any one sample = 25 (1) mpn

Violations state Operating Criteria: Any one sample = 23 (1) mpn

Violations of Federal Operating Criteria by Treatment Plants = 0

Violations of Federal Operating Criteria by Industrial Wastes = 0

Violations of Federal Operating Criteria by Streams = 0

Violations of Federal Operating Criteria by Estuary = 0

Violations of Federal Operating Criteria by Bay = 0

Violations of Federal Operating Criteria by Ocean = 0

Violations of Federal Operating Criteria by Tributaries = 0

Violations of Federal Operating Criteria by Recreational Waters = 0

Violations of Federal Operating Criteria by Water Supplies = 0

Violations of Federal Operating Criteria by Shellfish Beds = 0

Violations of Federal Operating Criteria by Industrial Wastes = 0

Violations of Federal Operating Criteria by Streams = 0

Violations of Federal Operating Criteria by Estuary = 0

Violations of Federal Operating Criteria by Bay = 0

Violations of Federal Operating Criteria by Ocean = 0

Violations of Federal Operating Criteria by Tributaries = 0

Violations of Federal Operating Criteria by Recreational Waters = 0

Violations of Federal Operating Criteria by Water Supplies = 0

Violations of Federal Operating Criteria by Shellfish Beds = 0

TABLE NO. 3

Summary of Quarantine Inspection in the Northwest
September 1927 to January 1928.

Inspection Point	Period of Inspection	No. Ribes or Pine Shots.from Eastern Quar. Zone	Western Quar. Zone	Not Quar. Zone	Number Inspected	Number Not Inspected	Number of Violations State	Federal	Shipments Reported to States	No.Loose Parcel Post
			P A R C E L P O S T							
Pendleton	10/17/27-11/31/27				122					95
Portland	10/10/27-1/1/28		8		1,149			2		1,131
Seattle	10/6/27-1/1/28				6,730			2		
Spokane	9/6/27-12/11/27			2	1,188			2		903
Tacoma	10/10/27-12/22/27		17		990			1	39	910
Total			25	2	10,179			7	39	3,039
			E X P R E S S							
Pendleton	10/17/27-11/30/27				319	2			135	
Portland	10/10/27-1/1/28		7		1,115			1		
Seattle	10/6/27-1/1/28				2,441			1		
Spokane	9/6/27-12/11/27				519			1		
Tacoma	10/10/27-12/22/27		23	1	746	76		1	26	
Total			30	1	5,140	78		4	151	
			F R E I G H T							
Pendleton	11/17/27-11/30/27				11	29			11	
Portland	10/10/27-1/1/28				334					
Seattle	10/6/27-1/1/28									
Spokane	9/6/27-12/11/27				40	12			18	
Tacoma	10/10/27-12/22/27		1		49	2			8	
Total			1		434	43			37	

TABLE No. 4

Summary of Operating Inspection
in the Northwest
September, 1927 to January, 1928

Shipper	Frequency	Transporting Agency	Federal Operating at: Black Cherries	Other Wines	White Pine
			No. Plants	No. Inspections	No. Violations
Parcel Post		Parcel Post		3	25
Express	Irregular	Express		1	24
Freight		Parcel Post		1	1
Indirect		Express		1	1
Total				6	52

Violations Federal Operations 52 = 11

Black shipments = 5 shipments 32 plants
Pine shipments = 5 shipments 5 plants

Violations of Federal operation by murderers = 4
Violations of Federal operation by individuals = 7

Summarizing these two tables we have the following:

Transporting Agency	Shipments Inspected	Violations
Parcel Post	44,311	25(+22 state)
Express	16,322	7(+ 3 state)
Freight	311	0

Violations by murderers 10 (+ 6 state)
Violations by individuals 20 (+ 15 state)

Pine shipments in violation of Federal Operations 7 constituting 12 plants
Black shipments in violation of Federal Operations 33 constituting 73 plants

The reporting of violation of state bill[illegible] must regulations in the same manner as Federal regulations was discontinued during the fall inspection season. The inspector in each case of this kind reported the matter direct to the state inspector for his disposition.

2. Inspection of automobiles crossing Columbia River

a. Introduction

Probably the most serious problem that we have in the West is that presented on the coast region between Washington and Oregon. This general coast region is the native habitat for the red flowering currant, Ribes sanguineum. During the month of April it produces a wonderful display of beautiful red flowers which are very attractive to all people who are on spring outings. As a result, a great many tourists, passing over the bridges and ferries between Washington and Oregon, collect these plants and transport them, one way or the other, across this river. Since the coast region of Washington is quite generally infected with blister rust, and it appears that this particular plant is a favorable host, there is grave danger that the blister rust will be transported into the Willamette Valley of Oregon by this means. The period of transportation of these plants also coincides with the period of infection of the wild currants by white pine blister rust.

Realizing this situation, the Oregon State Board of Horticulture in cooperation with this office, did some inspection work at the different bridges and ferries during this spring. This inspection work was done chiefly on Sundays.

b. Purpose

The purpose of this work was to detect as many parties as possible who were transporting plants across the river from Washington into Oregon, educate the public regarding the quarantine, and stop the transportation of these plants.

c. Personnel

Two inspectors were located at the Interstate bridge at Portland, Oregon. Two other inspectors spent short periods at other crossings.

d. Results

The following table gives a summary of the one hundred and forty-two violations which were inspected according to the number of individuals from whom these plants were taken in the course of the inspection work, and the state of origin:

b. Purpose

The purpose of this work was to detect as many persons as possible who were transporting plants across the river from Washington into Oregon, educate the public regarding the quarantine, and stop the transportation of these plants.

c. Personnel

Two inspectors were located at the Interstate bridge at Portland, Oregon. Two other inspectors spent short periods at other crossings.

d. Results

The following table gives a summary of the one hundred and forty-two violations which were inspected according to the number of individuals from whom these plants were taken in the course of the inspection work, and the state of origin:

TABLE NO. 5

Date Inspection	Number of cars by State license					
	Oregon	Wash.	Calif.	Mich.	Idaho	B.C.
March 27	14	3	1			
April 3	20	5	2			
April 10	28	4	1	1		
April 17	16	8				
April 24	34	2			1	
May 1	1					1
Total	113	22	4	1	1	1

The names of the owners of the cars according to the state records for the license on the car, were obtained and a circular letter with a bulletin was sent to each party. All parties were reached by mail except one, in which case the letter was returned unclaimed. Replies were received from 83 parties. All admitted the charge except fourteen. Evidently the wrong license number was obtained in these cases.

Since infection has spread more extensively in Oregon it may appear that this work should be discontinued. Indications from correspondence which has been received are that several of the cars were traveling considerably beyond the present known infection in Oregon such as to Salem and Marshfield. A further reason for continuing the work is that the Federal quarantine still forbids the transportation of Ribes from Washington to Oregon. If the work is not continued then the quarantine should be changed so as to make the entire infected area one unit and thus remove the restriction.

3. Investigation of Christmas Tree Shipments - fall, 1927

a. Introduction

A preliminary investigation of the Christmas tree trade on the Pacific coast in December, 1926 revealed the following conditions:

(1) Many carloads of Christmas trees are shipped from regions infected with blister rust.

(2) Shippers were not aware of quarantine regulations.

(3) White pines were being sold locally for Christmas trees.

(4) White pines were being shipped by mail and express for Christmas trees.

(5) There was a possibility that the larger shipments of Christmas trees might contain white pine.

TABLE No. 5

Date Inspection	Number of cars by State License				
	Oregon	Wash.	Calif.	Wash.	Idaho	D.C.
March 27	14	3	1			
April 3	40	5	3			
April 10	39	4	1	1		
April 17	16	3				
April 24	34	2			1	
May 1	1					1
Total	143	17	4	1	1	1

Generally the names of the owners of the cars according to the public state records for the license on the car, were obtained and a circular letter with a bulletin was sent to each party. All parties were reached by mail except one, in which case the letter was returned unclaimed. Replies were received from 23 parties. All admitted the charge except fourteen. Evidently the wrong license number was obtained in these cases.

Since infection has spread more extensively in Oregon it may appear that this work should be discontinued. Indications from correspondence which has been received are that several of the cars were traveling considerably beyond the present known infection in Oregon such as to Salem and Marshfield. A further reason for continuing the work is that the Federal quarantine still forbids the transportation of Ribes from Washington to Oregon. If the work is not continued then the quarantine should be changed so as to make the entire infected area one unit and thus remove the restriction.

3. Investigation of Christmas Tree Shipments - Fall, 1927

a. Introduction

A preliminary investigation of the Christmas tree trade on the Pacific coast in December, 1926 revealed the following conditions:

(1) Many carloads of Christmas trees are shipped from regions infected with blister rust.

(2) Shippers were not aware of quarantine regulations.

(3) White pines were being sold locally for Christmas trees.

(4) White pines were being shipped by mail and express for Christmas trees.

(5) There was a possibility that the larger shipments of Christmas trees might contain white pine.

b. Purpose

In view of these facts a detailed investigation of this trade was made during November and December, 1927. The purpose of this workwas as follows:

(1) To inform all parties engaged in cutting, selling or transporting these trees, regarding white pine blister rust and the restrictions on the shipping of white pine out of the State of Washington.

(2) To work in cooperation with the state inspectors in preventing the shipment of white pine as Christmas trees.

(3) By publicity, educate the public regarding the blister rust and the quarantine regulations.

(4) To determine the volume of this trade.

(5) To inspect as many cutting areas in order to determine whether white pine were present or not.

(6) To determine whether white pine was used or shipped for Christmas trees.

c. Personnel

One man, Mr. G. A. Felch, was engaged during October and November in carrying out the purposes of this project.

d. Results

(1). Informing parties engaged in the trade.

(a) Transporting agencies.

All railroads, steamship lines, and customs houses were asked to and agreed to supply the following information or cooperation:

1. Name and address of all shippers and points of loading, date of loading and destination of each carload.

2. Number of freight depots.

3. Place quarantine posters in all freight depots.

4. Agents to inform all shippers of quarantine.

b. Purpose

In view of these facts a detailed investigation of this trade was made during November and December, 1927. The purpose of this work was as follows:

(1) To inform all parties engaged in cutting, selling or transporting these trees, regarding white pine blister rust and the restrictions on the shipping of white pine out of the State of Washington.

(2) To work in cooperation with the state inspectors in preventing the shipment of white pine as Christmas trees.

(3) By publicity, educate the public regarding the blister rust and the quarantine regulations.

(4) To determine the volume of this trade.

(5) To inspect as many cutting areas in order to determine whether white pine were present or not.

(6) To determine whether white pine was used or shipped for Christmas trees.

c. Personnel

One man, Mr. G. A. Telch, was engaged during October and November in carrying out the purposes of this project.

d. Results

(1). Informing parties engaged in the trade.

(a) Transporting agencies.

All railroads, steamship lines, and customs houses were asked to and agreed to supply the following information or cooperation:

1. Name and address of all shippers and points of loading, date of loading and destination of each carload.

2. Number of freight depots.

3. Place quarantine posters in all freight depots.

4. Agents to inform all shippers of quarantine.

These agencies were supplied with quarantine notices and outlines of the quarantine which they distributed to these agents with letters instructing them to follow the regulations carefully. Satisfactory cooperation was obtained from all agencies. Since the quarantine poster recommended to the Washington Office in April, 1926, was not provided, nothing was available for posting at shipping points.

(b) Contractors and shippers

All of the larger contractors were interviewed and the blister rust problem and quarantine regulations were explained to them. These men responded actively since they are very desirous not to let anything happen which might cause the promulgation of any regulations which would be detrimental to their business. They immediately issued circular letters to all of their sub-contractors, cutters and inspectors demanding that they be very careful not to include any white pine in their Christmas tree loading. This hearty cooperation was apparently effective since no white pine were found in any of the carload shipments which were inspected.

The small individual shipper of one or two cars as well as those who are moving this stock by truck are the ones with whom it has been difficult to establish contact. Further they are the ones who may handle white pine as Christmas trees. By means of information from the railroads, contact was made with some of these shippers.

(c) Customs officials

The requests for reports of Christmas tree shipments from customs house officials were made by Mr. W. A. Webb, Port Inspector of the Federal Horticultural Board. Upon receiving the reports Mr. Webb notified the state of destination.

(2) Cooperation with state inspectors.

Personal contacts were made with all of the district horticultural inspectors in the coast region of Washington and satisfactory cooperation was obtained in each case. Notices of shipments were sent to the district inspector in whose district the shipment originated. If possible he inspected the shipment. If not possible, the chief inspector of the state of destination was notified. These inspectors were supplied with quarantine notices and outlines for distribution.

Up to the time of this investigation not a great deal of attention had been given to the inspection of these shipments. However, the inspectors soon realized the possibilities of the situation, and gave even better cooperation than was at first thought it would be possible to get. As a result a majority of the shipments were inspected either at the time of loading or the cutting area was inspected by the state inspectors. Those which were not inspected satisfactorily were reported to the state of destination.

These agencies were supplied with quarantine notices and outlines of the quarantine which they distributed to these agents with letters instructing them to follow the regulations carefully. Satisfactory cooperation was obtained from all agencies. Since the quarantine poster recommended to the Washington Office in April, 1926, was not printed, nothing was available for posting at shipping points.

(b) Contractors and shippers

All of the larger contractors were interviewed and the blister rust problem and quarantine regulations were explained to them. These men responded actively since they are very desirous not to let anything happen which might cause the promulgation of any regulations which would be detrimental to their business. They immediately issued circular letters to all of their sub-contractors, cutters and inspectors demanding that they be very careful not to include any white pine in their Christmas tree loading. This hearty cooperation was apparently effective since no white pine were found in any of the carload shipments which were inspected.

The small individual shipper of one or two cars as well as those who are moving this stock by truck are the ones with whom it has been difficult to establish contact. Further they are the ones who may handle white pine as Christmas trees. By means of information from the railroads, contact was made with some of these shippers.

(c) Customs officials

The requests for reports of Christmas tree shipments from customs houses officials were made by Mr. W. A. Webb, Port Inspector of the Federal Horticultural Board. Upon receiving the reports Mr. Webb notified the state of destination.

(2) Cooperation with state inspectors.

Personal contacts were made with all of the district horticultural inspectors in the coast region of Washington and satisfactory cooperation was obtained in each case. Notices of shipments were sent to the district inspector in whose district the shipment originated. If possible he inspected the shipment. If not possible, the chief inspector of the state of destination was notified. These inspectors were supplied with quarantine notices and outlines for distribution.

Up to the time of this investigation not a great deal of attention had been given to the inspection of these shipments. However, the inspectors soon realized the possibilities of the situation, and gave even better cooperation than was at first thought it would be possible to get. As a result a majority of the shipments were inspected either at the time of loading or the cutting area was inspected by the state inspectors. Those which were not inspected satisfactorily were reported to the state of destination.

(3) Publicity

Personal contacts were had with as many shippers, state men, carriers, Forest Service men, and others as possible. Personal letters with bulletins and a copy of the quarantine were sent to 30 1926 shippers. Through the railroads, instructions and quarantine notices were sent to 485 freight agents. Similar material was sent to 25 steamship companies. The American Railway Express Company sent this material to each one of their 300 offices on the coast. State inspectors put articles in the local newspapers regarding the quarantine, warning the public not to ship white pine for Christmas tree purposes.

(4) Volume of the trade

(a) Shipments from Washington

Records of the number of carloads of Christmas trees from the following places by counties were made:

Clallam County: Sequim, 2; Blyn, 1; Agnew, 1.

Clarke County: Vancouver, 1; Fisher, 1; Camas, 1; Washougal, 1.

Cowlitz County: Olequa, 2; Woodland, 2; Guerrier, 1.

Ferry County: Danville, 3; Summit, 1; Plum, 1.

Grays Harbor County: Elma, 3.

Jefferson County: Coyle, 9.

King County: Seattle, 15; Nisqually, 1; Fandstrum, 3; Maplevalley, 3; Ravensdale, 2; Cumberland, 2; Riverton, 1; Covington, 2; Enumclaw, 1; Bothell, 1.

Kitsap County: Charleston, 5; Poulsbo, 4; Silverdale, 4; Colby, 1.

Lewis County: Winlock, 20; Napavine, 7; Chehalis, 6; Vader, 4; Eveline, 1; Adna, 1; Ceres, 1.

Mason County: Shelton, 19.

Pierce County: Frederickson, 3; Offert Lake, 1; Tacoma, 2; Puyallup, 3; Sumner, 1; Spanaway, 2; Kirby, 1; Gig Harbour, 1; Roy, 1.

(3) Publicity

Personal contacts were had with as many shippers, state men, carriers, Forest Service men, and others as possible. Personal letters with bulletins and a copy of the quarantine were sent to 30 1926 shippers. Through the railroads, instructions and quarantine notices were sent to 458 freight agents. Similar material was sent to 25 steamship companies. The American Railway Express Company sent this material to each one of their 500 offices on the coast. State inspectors put articles in the local newspapers regarding the quarantine, warning the public not to ship white pine for Christmas tree purposes.

(4) Volume of the trade

(a) Shipments from territory

Records of the number of carloads of Christmas trees from the following places by counties were made:

Clallam County: Sequim, 3; Dyra, 1; Agnew, 1.

Clarke County: Vancouver, 1; Fisher, 1; Camas, 1; Washougal, 1.

Cowlitz County: Olequa, 2; Woodland, 2; Guerrier, 1.

Ferry County: Danville, 3; Summit, 1; Flum, 1.

Grays Harbor County: Elma, 2.

Jefferson County: Coyle, 2.

King County: Seattle, 18; Wequally, 1; Tanaterum, 3; Maplevalley, 3; Ravensdale, 2; Cumberland, 2; Riverton, 1; Covington, 2; Dumond, 1; Bothell, 1.

Kitsap County: Chemerton, 5; Poulsbo, 4; Silverdale, 4; Colby, 1.

Lewis County: Winlock, 20; Napavine, 7; Chehalis, 6; Vader, 4; Dwellano, 1; Adna, 1; Ceres, 1.

Mason County: Shelton, 12.

Pierce County: Fredericksen, 3; Clifert Lake, 1; Tacoma, 2; Puyallup, 2; Sumner, 1; Spanaway, 2; Kirby, 1; Gig Harbour, 1; Key, 1.

Skagit County: Burlington, 1; Birdsview, 2; Cook, 1; Hamilton, 6.

Skamania County: Carson, 1: Stevenson, 1.

Snohomish County: Maltby, 1; Kenmore, 2; Mukilteo, 3; Edmonds, 2; Darrington, 2.

Thurston County: Ranier, 3; Belmore, 1; Tenino, 1; Chambers Prairie, 2; St. Clair, 1; Black Lake, 10; Rochester, 1; Yelm, 2.

Whatcom County: Wickersham, 1; Bellingham, 1.

Whitman County: Belmont, 1.

(b) Shipments from Oregon

This season a record was obtained of only one carload from Willsboro and five from Molalla. Some records were obtained showing that in 1926 the following carloads were shipped from Oregon points: Medford, 2; Riddle, 2; Beaverton, 1; Molalla, 1; Drain, 1; Leland, 1; Junction City, 1; Canby, 1; Albany, 1; Marcola, 1; Connell, 1. Since only one man was employed on this work very little investigation of Oregon was made other than what could be obtained by correspondence.

(c) Shipments from British Columbia

The investigation of Christmas tree shipments from British Columbia was done by Mr. Webb, Federal Port Inspector, at Seattle, Washington. During 1927 he received reports of eighteen carloads originating on Vancouver Island. No further data is available regarding these shipments other than that as the reports were received Mr. Webb notified the state of destination.

An investigation of the custom house records for Blaine, Washington revealed the following carload shipments from British Columbia in 1926: Nanaimo,3; Ladysmith,3; Cowichan,1; Chemainus,2; Wellington,5; Cobble Hill,3; Shawnigan Lake,1; Parksville,2.

(d) Destination of shipments

The following are records of destination of carloads of Christmas trees from Washington:

Arizona: Phoenix, 3; Tucson, 1.
California: Los Angeles, 79; San Francisco,24; Oakland,26; Sacramento, 1; San Diego,4; San Jose,2; Stockton,1; Pasadena,1; Inglewood,1; Fresno,1.
Delaware: Wilmington, 1.
Hawaii: Honolulu, 3.
Idaho: Twin Falls, 1; Boise, 4.
Illinois: Decatur, 1; Chicago, 4.
Indiana: Evansville, 1.
Iowa: Sioux City, 1.
Kansas: Coffeyville,1; Pittsburg,1 Wichita, 4; Salina, 1.
Missouri: Kansas City,4;St.Louis,2
Nebraska: Omaha, 1; Grand Island, 1.

Skagit County: Burlington, 1; Birdsview, 2; Cook, 1; Hamilton, 6.

Skamania County: Carson, 1: Stevenson, 1.

Snohomish County: Maltby, 1; Kenmore, 2; Mukilteo, 3; Monroe, 2;
Darrington, 2.

Thurston County: Olympia, 1; Tenino, 1; Chambers Prairie, 2;
Olympia, 1; Tumwater, 10; Rochester, 1; Yelm, 2.

Whatcom County: Bellingham, 1; Ferndale, 1.

Whitman County: Belmont, 1.

(b) Shipments from Oregon

This season a record was obtained of only one carload from Milton and five from Molalla. Some records were obtained showing that in 1928 the following carloads were shipped from Oregon points: Medford, 2; Middle, 2; Beaverton, 1; Molalla, 1; Salem, 1; Leland, 1; Junction City, 1; Canby, 1; Albany, 1; Corvallis, 1; Gaswell, 1. Since only one man was employed on this work very little investigation of Oregon was made other than what could be obtained by correspondence.

(c) Shipments from British Columbia

The investigation of Christmas tree shipments from British Columbia was done by Mr. Wells, Federal Port Inspector, at Seattle, Washington. During 1929 he received records of eighteen carloads originating on Vancouver Island. No further data is available regarding these shipments other than that as the reports were received Mr. Wells notified the state of destination.

An investigation of the custom house records for Blaine, Washington revealed the following carload shipments from British Columbia in 1929: Wenatchee,2; Ladysmith,1; Cowichan,1; Chemanus,2; Wellington,3; Cobble Hill,3; Shawnigan Lake,1; Parksville,2.

(d) Destination of shipments

The following are records of destination of carloads of Christmas trees from Washington:

Arizona: Phoenix, 2; Tucson, 1.
California: Los Angeles, 75; San Francisco, 4; Oakland,28; Sacramento, 1;
San Diego,4; San Jose,3; Stockton,1; Pasadena,1; Inglewood,1;
Fresno,1.
Delaware: Wilmington, 1.
Kansas: Topeka, 3.
Idaho: Twin Falls, 1; Boise, 4.
Illinois: Decatur, 1; Chicago, 4. Kansas: Coffeyville,1; Pittsburg
Indiana: Evansville, 1.
Iowa: Sioux City, 1. Missouri: Kansas City,4; St.Louis
Michigan, 4; Salina, 1.
Nebraska: Omaha, 1; Grand Island, 1.

New York: New York, 1.
North Dakota: Bismark, 1.
Ohio: Cincinnati, 2; Dayton, 2; Coveland, 1.
Oklahoma: Oklahoma City, 6; Tulsa, 1.
Pennsylvania: Pittsburg, 7.
Texas: Houston, 3; Fort Worth, 1; Dallas, 2; San Antonio, 1; El Paso, 1; Galveston, 1.
Utah: Salt Lake, 13.

(e) Number of trees shipped.

Generally the specifications of the contracts of the shippers calls for Douglas fir, but occasionally other firs or pines are mixed in the shipments. The trees which are used are from 2 to 15 feet in height. Records for the number of trees shipped per car were obtained for twenty cars shipped. The number of trees in each car varied from 2,500 to 10,660. The total for the twenty cars was 90,988 trees or an average of 4,550 trees per car. Records were obtained of the shipment of 227 cars during 1927 or approximately 1,032,850 trees. It appears therefore that approximately one million coniferous trees were shipped from the coast region during November and December for Christmas tree purposes. Estimating 500 trees per acre, the Christmas tree shipments from this region represent the clearing or deforestation of approximately 2,000 acres. Estimating the average sale price at destination as $2.00, this business represents a cash value of two million dollars. This does not take into consideration the local trade in those trees which in the entire states of Washington and Oregon may represent the cutting of another million trees.

(f) Shippers.

Forty-three different shippers were recorded. However, most of these shippers handle only a carload or two while the major portion of the trade is carried on by four or five concerns which are making a regular business of Christmas tree shipping.

There seems to be a growing number of direct truck shipments to points in California as well as for shorter distances into Oregon and parts of Washington.

(5) Use of white pine for Christmas trees.

In the coast region several instances have been noted of the white pine being used locally for Christmas tree purposes. Also some shipments by mail and express of white pine for Christmas trees and decorations have been intercepted. No cases of the shipment of white pine in the carload lots have been observed, either in the case of inspections made at the time of loading or as a result of inspection at destination. This is probably due to two reasons: (1) The contracts for Christmas trees call for Douglas fir and (2) the general distribution of information regarding the blister rust quarantine by Federal and state inspectors.

New York: New York, 1.
North Dakota: Bismark, 1.
Ohio: Cincinnati, 2; Dayton, 2; Cleveland, 1.
Oklahoma: Oklahoma City, 6; Tulsa, 1.
Pennsylvania: Pittsburg, 7.
Texas: Houston, 3; Fort Worth, 1; Dallas, 2; San Antonio, 1;
El Paso, 1; Galveston, 1.
Utah: Salt Lake, 12.

(c) Number of trees shipped.

Generally the specifications of the contracts of the shippers calls for Douglas fir, but occasionally other fire or pines are mixed in the shipments. The trees which are used are from 5 to 15 feet in height. Records for the number of trees shipped per car were obtained for twenty cars shipped. The number of trees in each car varied from 6,500 to 10,600. The total for the twenty cars was 20,382 trees or an average of 4,850 trees per car. Records were obtained of the shipment of 227 cars during 1927 or approximately 1,082,850 trees. It appears therefore that approximately one million coniferous trees were shipped from the coast region during November and December for Christmas tree purposes. Estimating 500 trees per acre, the Christmas tree shipments from this region represent the clearing or deforestation of approximately 2,000 acres. Estimating the average sale price at destination as $2.00, this business represents a cash value of two million dollars. This does not take into consideration the local trade in these trees which in the entire states of Washington and Oregon may represent the cutting of another million trees.

(d) Shippers.

Forty-three different shippers were recorded. However, most of these shippers handle only a carload or two while the major portion of the trade is carried on by four or five concerns which are making a regular business of Christmas tree shipping.

There seems to be a growing number of direct truck shipments to points in California as well as for shorter distances into Oregon and parts of Washington.

(e) Use of white pine for Christmas trees.

In the coast region several instances have been noted of the white pine being used locally for Christmas tree purposes. Also cone shipments by mail and express of white pine for Christmas trees and decorations have been intercepted. No cases of the shipment of white pine in the carload lots have been observed, either in the case of interstate trade at the time of loading or as a result of inspection at destination. This is probably due to two reasons: (1) The consumers for Christmas trees call for Douglas fir and (2) the general distribution of information regarding the blister rust quarantine by federal and state inspectors.

e. Certification of Christmas tree shippers.

The treatment of Christmas trees as nursery stock would make it necessary for these dealers to take out a regular license to carry on this business. The possibility of this action has raised three questions: (1) Are Christmas trees nursery stock according to the horticultural laws? (2) Can a state require the purchase of a license from those engaged in this trade? (3) Is there a conflict between state and Federal authority in this case? As far as the use of white pine is concerned, this matter is covered by Federal Quarantine No. 63 and the state has no jurisdiction. If it is desirable to certify these shipments are free from other pests, then the state has authority. Because of the prevalence of woolly aphis, leaf cast, and other diseases on Douglas fir, it appears as desirable that the state inspect these shipments and prevent as far as possible the distribution of these diseases.

C. Recommendations

1. Inspection of trains.

The status of inspection work upon trains is still in a rather uncertain condition. Although no definite authority has been granted us for this type of inspection, as a rule, the officers of the Post Office Department who were immediately in charge of the mail, invited the inspection. The Chief Clerk at Spokane--that is, for the Spokane District--issued orders to all his mail clerks on trains to either have the nursery stock ready for inspection at the door of the train, or if an inspector was not available, to unload the material at Spokane, so that it could be inspected. In view of this cooperation, it was necessary that our inspectors meet every train, and as a result, it became necessary to place three men on inspection work at Spokane where formerly we have had but two. This arrangement has worked out very satisfactory for us and has resulted in a very high efficiency in inspection work at this point. On the other hand, at Pendleton, Oregon, the inspector was refused admittance to mail cars under order of the Superintendent of Mails at Portland, Oregon, to the effect that we had no authority to make such inspection. We have directed our work according to these instructions. However, it would be highly desirable if this matter could be taken up through proper channels and a definite agreement reached as to whether we should or should not be allowed to inspect this material, so that we can carry on the same type of inspection work at each point.

2. Educational work.

It appears that the biggest problem and need for the successful development of quarantine work is of educational work. Contact should be established with not only all nurserymen who have taken out permits, but many large nurserymen who have not thus far taken them out. I am sure if they understood the quarantine, many more would make use of it. Further

e. Certification of Christmas tree nurseries.

The inspection of Christmas trees as nursery stock would make it necessary for these dealers to take out a regular license to carry on this business. The possibility of this section has raised three questions: (1) Are Christmas trees nursery stock according to the horticultural laws? (2) Can a state require the purchase of a license from those engaged in this trade? (3) Is there a conflict between state and federal authority in this case? As far as the use of white pine is concerned, this matter is covered by Federal Quarantine No. 63 and the state has no jurisdiction. If it is desirable to certify these shipments are free from other pests, then the state has authority. Because of the prevalence of woolly aphis, leaf canker, and other diseases on Douglas fir, it appears as desirable that the state inspect these shipments and prevent as far as possible the distribution of these diseases.

6. Recommendations

1. Inspection of trees.

The status of inspection work upon trains is still in a rather uncertain condition. Although no definite authority has been granted us for this type of inspection, as a rule, the officers of the Post Office Department who were immediately in charge of the mail, invited the inspection. The Chief Clerk at Spokane--that is, for the Spokane District--issued orders to all his mail clerks on trains to either have the nursery stock ready for inspection at the door of the train, or if an inspector was not available, to unload the material at Spokane, so that it could be inspected. In view of this cooperation, it was necessary that our inspectors meet every train, and as a result, it became necessary to place three men on inspection work at Spokane where formerly we have had but two. This arrangement has worked out very satisfactory for us and has resulted in a very high efficiency in inspection work at this point. On the other hand, at Pendleton, Oregon, the inspector was refused admittance to mail cars under order of the Superintendent of Mails at Portland, Oregon, to the effect that we had no authority to make such inspection. We have directed our work according to these instructions. However, it would be highly desirable if this matter could be taken up through proper channels and a definite agreement reached as to whether we should or should not be allowed to inspect this material, so that we can carry on the same type of inspection work at each point.

2. [illegible] work.

It appears that the biggest problem and need for the successful [illegible] of quarantine work is of educational work. Growers should be [illegible] with not only all nurserymen who have taken out permits, but many large [illegible] who have not time for taken them out. I am sure if they understood the quarantine, many more would make use of it. Further

there is need for more educational work among the different state inspectors. Practically none of them have a thorough conception of the regulations under this quarantine and thus far seem unable to obtain definite ideas regarding the matter from the quarantine itself. Considerable personal contact work should be done along this line, as well as the distribution of circular letters explaining parts of the quarantine. Steps should be taken to cover this situation during the next field season.

3. Parcel Post Problem.

From the tabulation of quarantine violations, it is evident that the parcel post shipments represent the chief problem to be solved. It will be noted that of the sixty-five violations which were intercepted during this past season, only ten were by express. All the remainder were by parcel post. With reference to Quarantine 63 as it applies to shipments of currants and gooseberries out of uninfected states to any other state, there appears to be a need of considerable constructive work in the several states in order to make arrangements so that the shipper may be able to get his plants inspected and certified. The net result will be that the shipment of these plants by private individuals will be practically eliminated unless this matter is worked out. I think that investigation will show that postmasters as a rule would be unable to tell parties where to send their plants in the state in order to have them inspected before they go outside of the state. I believe all postmasters except where there is an inspector located at that point should have this information. In consideration of this problem, I believe that the Post Office Department each year should issue to all of their postmasters instructions as to where to send plants in a particular state so that these plants may be properly inspected. This matter should be worked out with each state so that they will all make a definite agreement to have an inspector handle this material wherever it may be sent. In a great many of the states, they have temporary inspectors with the possible exception of one state inspector who is on for full time. I believe that the most feasible plan would be to have one point in each state where the Post Office Department could send these plants for inspection. If possible, the plants should be routed through that point without additional charge to the shipper. Unless this matter is worked out, under Quarantine 63, it will be practically impossible for the private shipper to ship currants and gooseberries from an uninfected state because we have made it a policy, under the direction of the Board, to return any and all such shipments which do not have an inspection tag.

4. Inspecting freight shipments.

It does not appear practicable or necessary that an attempt be made to inspect freight shipments except at point of destination. It is impossible to satisfactorily open up, inspect, and report these shipments in transit because of the size of the shipments. It is believed that the most satisfactory arrangement would be for the inspector simply to make arrangements with the freight agents to report on a definite form

there is need for more educational work among the different state inspectors. Practically none of them have a thorough conception of the regulations under this quarantine and time far been unable to obtain definite ideas regarding the matter from the quarantine itself. Considerable personal contact work should be done along this line, as well as the distribution of circular letters explaining parts of the quarantine. Steps should be taken to cover this situation during the next field season.

5. Parcel Post Problem.

From the tabulation of quarantine violations, it is evident that the parcel post shipments represent the chief problem to be solved. It will be noted that of the sixty-five violations which were intercepted during this past season, only ten were by express. All the remainder were by parcel post. With reference to Quarantine 63 as it applies to shipments of nurserymen and gooseberries out of uninfected states to any other state, there appears to be a need of considerable constructive work in the several states in order to make arrangements so that the shipper may be able to get his plants inspected and certified. The net result will be that the shipment of these plants by private individuals will be practically eliminated unless this matter is worked out. I think that investigation will show that postmasters as a rule would be unable to tell parties where to send their plants in the state in order to have them inspected before they go outside of the state. I believe all postmasters except where there is an inspector located at that point should have this information. In consideration of this problem, I believe that the Post Office Department each year should issue to all of their postmaster instructions as to where to send plants in a particular state so that these plants may be properly inspected. This matter should be worked out with each state so that they will all make a definite agreement to have an inspector handle this material wherever it may be sent. In a great many of the states, they have temporary inspectors with the possible exception of one state inspector who is on for full time. I believe that the most feasible plan would be to have one point in each state where the Post Office Department could send these plants for inspection. If possible, the plants should be routed through that point without additional charge to the shipper. Unless this matter is worked out, under Quarantine 63, it will be practically impossible for the private shipper to ship currants and gooseberries from an uninfected state because we have made it a policy, under the direction of the Board, to return any and all such shipments which do not have an inspection tag.

6. Inspection [illegible] shipments.

It does not appear practicable or necessary that an attempt be made to inspect freight shipments except at point of destination. It is impossible to satisfactorily open up, inspect, and reseal these shipments in transit because of the size of the shipments. It is believed that the most satisfactory arrangement would be for the inspector simply to make arrangements with the freight agents to report on a definite form

to them, all freight shipments. He, in turn, should report these to the individual states. Freight agents should be required to provide this information when it is requested by a Federal inspector.

5. Shipping Ribes into Canada.

Since Canada now permits the importation of currants and gooseberries which are grown for fruit this market should not be closed by regulations of this country. Therefore, it is recommended that Federal Quarantine No. 63 should be amended as to permit shippers in any state to ship into Canada without a Federal permit.

6. Refunding money to consignee.

Definite Federal regulations should be set forth compelling the shipper to refund the purchase price to the purchaser in all cases where he sells plants in violation of quarantines. Likewise, the transporting agency which accepts plants for shipment in violation of quarantines and collects either from the shipper or consignee should be required as a penalty to submit evidence of reimbursement of the money paid for transportation.

7. Changes in quarantine regulations.

a. That either Federal Quarantine No. 63 be amended to make the quarantined area in Oregon and the State of Washington a unit area instead of two separate areas or inspection of all autos across the Columbia River be carried on during the spring when the red flowering currant is in full bloom.

b. Recommend to the State of Oregon that Quarantine No. 18 now No. 5 be changed so that the same regulations regarding the growing of white pine apply to the counties within the quarantined areas as those which apply to counties outside the quarantined area in Oregon.

c. That only that portion of Idaho be quarantined which lies north of the Salmon River. There is no reason for quarantining the entire state. But for the fact that Idaho has established a control area including most of the above territory, it would not be desirable even to include this much of the state.

d. That the portion of Idaho which is quarantined should be made a unit area with the State of Washington. This is necessary due to the fact that several operators in white pine transport the logs into Washington for manufacture. Since many of these carloads will carry not only logs but branches, if the quarantine is not thus established, these will be violations of the quarantine. It does not appear necessary or possible to stop this traffic by means of quarantines.

to them, all freight shipments. He, in turn, should report these to the individual states. Freight agents should be required to provide this information when it is requested by a Federal Inspector.

4. Shipping Rigs into Canada.

Since Canada now permits the importation of nursery and ornamental plants which are grown for fruit this market should not be closed by regulations of this country. Therefore, it is recommended that Federal Quarantine No. 83 should be amended so as to permit shippers in any state to ship into Canada without a Federal permit.

5. Returning rigs to compliance.

Federal to Federal regulations should be set forth compelling the shipper to refund the purchase price to the purchaser in all cases where he sells plants in violation of quarantines. Likewise, the transporting agency which accepts plants for shipment in violation of quarantines and collects either from the shipper or consignee should be required as a penalty to furnish evidence of refunding of the money paid for transportation.

7. Changes in existing regulations.

a. That either Federal Quarantine No. 83 be amended to make the quarantined area in Oregon and the State of Washington a unit area instead of two separate areas or inspection of all autos across the Columbia River be carried on during the spring when the red flowering currant is in full bloom.

b. Recommend to the State of Oregon that Quarantine No. 12 now No. 5 be changed so that the same regulations regarding the growing of white pine apply to the counties within the quarantined areas as those which apply to counties outside the quarantined area in Oregon.

c. That only that portion of Idaho be quarantined which lies north of the Salmon River. There is no reason for quarantining the entire state. But for the fact that Idaho has established a control area including most of the above territory, it would not be desirable even to include this much of the state.

d. That the portion of Idaho which is quarantined should be made a unit area with the State of Washington. This is necessary due to the fact that several operators in white pine transport the logs into Washington for manufacture. Since many of these carloads will carry not only logs but branches, if the quarantine is not time established, these will be violations of the quarantine. It does not appear necessary or possible to stop this traffic by means of quarantines.

e. That a compilation of the rulings which have been made and are madefrom time to time interpreting the application of the blister rust quarantines to the various nursery practices be issued annually to all nurserymen.

f. That all nurseries no matter where located in the United States be required to obtain a Federal license to do interstate business.

g. That the Federal Horticultural Board in cooperation with the Post Office Department investigate thoroughly the parcel post problem and evolve a solution to the present situation. Parcel post is now the most frequent violator of Federal regulations and under present arrangements there is no satisfactory solution.

h. Regarding the Christmas tree problem it is recommended that: (1) a general educational program be carried out next year (2) that the certification of Christmas tree shipments be urged (3) that the quarantine poster which has been prepared, be printed and given general distribution and (4) that one Federal inspector be assigned to this work during November and December, 1928.

D. Summary

1. During the year some changes have been made in quarantine regulations chief of which was the establishment of a control area in Idaho, extension of Oregon quarantine and liberalization of Canadian regulations.

2. One hundred and eighty violations of Federal quarantine regulations and twenty-five violations of state regulations have been intercepted.

3. Christmas tree shipments are of considerable importance as a possible source of violations of blister rust quarantines since approximately one million trees are cut for this purpose each season.

4. Recommendations are made for proper authority for train inspection, educational work, solution of the parcel post problem, inspection of freight shipments, change in regulations on account of change in Canadian regulations, refunding money to consignee, making unit quarantine areas of Oregon, Washington, and Idaho, compilation of ruling of the Federal Board, licensing of all nurseries doing interstate business, suggesting an investigation of parcel post problem and certification of Christmas tree shipments.

c. That a compilation of the rulings which have been made and are made from time to time interpreting the application of the blister rust quarantines to the various nursery practices be issued annually to all nurserymen.

f. That all nurseries no matter where located in the United States be required to obtain a Federal license to do interstate business.

g. That the Federal Horticultural Board in cooperation with the Post Office Department investigate thoroughly the parcel post problem and evolve a solution to the present situation. Parcel post is now the most frequent violator of Federal regulations and under present arrangements there is no satisfactory solution.

h. Regarding the Christmas tree problem it is recommended that: (1) a general educational program be carried out next year (2) that the certification of Christmas tree shipments be urged (3) that the quarantine poster which has been prepared, be printed and given general distribution and (4) that one Federal inspector be assigned to this work during November and December, 1928.

D. Summary

1. During the year some changes have been made in quarantine regulations chief of which was the establishment of a control area in Idaho, extension of Oregon quarantine and liberalization of Canadian regulations.

2. One hundred and eighty violations of Federal quarantine regulations and twenty-five violations of state regulations have been intercepted.

3. Christmas tree shipments are of considerable importance as a possible source of violations of blister rust quarantines since approximately one million trees are cut for this purpose each season.

4. Recommendations are made for proper authority for this inspection of freight shipments, change in regulations on account of change in Canadian regulations, refunding money to consignee, making unit quarantine areas of Oregon, Washington, and Idaho, compilation of rulings of the Federal Board, licensing of all nurseries doing interstate business, suggesting an investigation of parcel post problem and certification of Christmas tree shipments.

PINE DAMAGE STUDIES
PROGRESS REPORT ON EXPERIMENTAL PLOT, CHEEKYE, B.C.

By
H. N. Putnam
Associate Pathologist

I. Introduction

The subject matter of this report pertains to the work done on the plot in 1927, with occasional references, for purposes of comparison, to work performed previously. This report deals with: (1) eradication of Ribes on plot and vicinity (2) Ribes ecological data; and (3) examination of planted pines for survival and infection.

II. Eradication of Ribes on Plot

From May 2 to May 7 the Ribes were eradicated from the plot by a crew of men varying in number from 4 to 7. Twine string was used to mark boundaries of eradicated strips.

No Ribes were found other than 1,2 and 2½ year old seedlings of R. sanguineum and R. lacustre. Table No. 1 shows the results of eradication.

I. Introduction

TABLE NO. 1

Ribes Found Cheekye Plot, May, 1927
Classified According to Degree of Burn and Quadrant

Degree of Burn	Quadrant	Ribes Species	Number and Locations	Number of Seedlings Per Year of Origin					Average Number of Seedlings Per Location
				1925	1926	1927	Doubtful	Total	
Duff	N.E.	R. sang.	26	2	56	144	0	202	
		R. lac.	1	0	0	1	0	1	
Partially Burned	S.E.	*R. sang.	4	0	56	1280	[illegible] 3	1,339	
		R. lac.		1				1	
Total			31	3	112	1425	3	1,543	49.8
Duff	S.E.	R. sang.	5	0	3	10	2	15	
Totally	S.W.	R. sang.	2	0	1		1	2	
Burned	N.W.	R. sang.	2	0	2	1	0	3	
Total.			9		6	11	3	20	2.2
Unburned	none	none	0	0	0	0	0	0	
Total on Plot		R. sang.	39	2	118	1435	6	1,561	
		R. lac.	1	1	0	1	0	2	
Total			40	3	118	1436	6	1,563	

*The one R. lacustre found was growing in association with R. sanguineum at the same location.

The term "location" as used in Table No. 1 is defined as an area 3 or 4 feet in diameter, except in the case of two locations, in which Ribes seedlings were found abundantly along an old logging railroad cut on two areas each approximately 40 by 75 feet in size.

Attention is called to certain facts apparent in Table No. 1.

1. Seedlings found were predominately those of R. sanguineum.

2. Seedlings germinated in 1927 were much greater in number than those germinating in 1925 or 1926.

3. Apparently there were 2 R. sanguineum and 1 R. lacustre that germinated in 1925 following the fire on September 30 of that same year.

4. There was much larger number of Ribes seedlings on the area of light burn than where the burn was heavy.

5. No Ribes seedlings were found on the unburned portions.

The relative sizes of Ribes seedlings of different ages is shown in the following table:

TABLE NO. 2

Size of Ribes Seedlings of Different Years of Germination

Species	Year of Germination					
	1925		1926		1927	
	Ave. Ht. (ft.)	Ave. Ft. L. S.	Ave. Ht. (ft.)	Ave. Ft. L. S.	Ave. Ht. (ft.)	Ave. Ft. L. S.
R. sanguineum	.75	.85	.18	.18	.02	.02
R. lacustre	.17	.17	-	-	.08	.08

III. Re-eradication of R. bracteosum from Areas on Lake Alice and Cheekye Creeks in 1927, Originally Eradicated in 1926

Table No. 3 shows the results of a recheck made in 1927 for R. bracteosum on two areas from which R. bracteosum was eradicated in 1926.

An unexpectedly high degree of efficiency by feet of live stem was obtained. It was feared that many of the bushes pulled and hung up in 1926 would fall down and start again. It was also thought that many of the roots necessarily left in the ground in 1926, under logs, etc., would send out new sprouts.

The term "location" as used in Table No. 1 is defined as an area 3 or 4 feet in diameter, except in the case of two locations in which Pines seedlings were found abundantly along an old logging railroad out on two areas each approximately 40 by 75 feet in size.

Attention is called to certain facts apparent in Table No. 1.

1. Seedlings found were predominately those of P. ponderosa.

2. Seedlings germinated in 1927 were much greater in number than those germinating in 1925 or 1926.

3. Apparently there were 3 P. ponderosa and 1 P. occidentalis that germinated in 1928 following the fire on September 30 of that same year.

4. There was much larger number of Pines seedlings on the area of light burn than where the burn was heavy.

5. No Pines seedlings were found on the unburned portions.

The relative place of Pines seedlings of different ages is shown in the following table:

Table No. 2

Site of Pines Seedlings of Different Years of Germination

Species	Year of Germination					
	1925		1926		1927	
	Ave. No. (Ft.)	Ave. % (Ft.)	Ave. No. (Ft.)	Ave. % (Ft.)	Ave. No. (Ft.)	Ave. % (Ft.)
P. ponderosa	.75	85	.13	13	.08	08
P. laemmtre	.17	.17	-	-	.08	08

Table No. 3 shows the results of a reburn made in 1927 for P. ponderosa on two areas from which P. ponderosa was eradicated in 1926.

As unexpectedly high degree of efficiency by feet of live stem was obtained. It was feared that many of the bunches pulled and hung up in 1926 would fall down and start again. It was also thought that many of the roots necessarily left in the ground in 1926, under logs, etc., would send out new sprouts.

It may be noted in Table No. 3 that the average size of bushes found in 1936 was nearly seven times that of bushes found in 1937.

TABLE No. 3

R. bracteosum found on Cheekye and Lake Alice Creeks in Spring of 1936 and Spring 1937

Location	Found 1936			Found 1937			% Efficiency of Eradication	
	No.	Total F.L.S.	Ave. F.L.S.	No.	Total F.L.S.	Ave. F.L.S.	by Number	by F.L.S.
Lake Alice Creek	570	14,964	26.2	48	172.4	3.6	98.2	98.9
Cheekye Creek	142	4,044	28.4	16	72.2	5.5	91.5	95.2
Total	712	18,958	26.6	61	244.6	4.0	98.1	98.7

The classification of R. bracteosum found in 1937 from the eradication point of view is shown in Table No. 4.

TABLE NO. 4

Classification of R. bracteosum Bushes found in 1937 on Lake Alice and Cheekye Creeks Eradication 1936

Number of Bushes and Feet of Live Stem	Missed Seedlings 1934 to 1935 Eradication	Missed Old Bushes	From Root Crowns or Stem Left in Ground	From Fallen Bushes Fallen to Ground	Totals
Number Bushes	17	16	24	7	61
Per Cent of Bushes	28%	26%	39%	12%	100%
Total Feet Live Stem	16.1	104.0	111.8	8.7	244.6
Ave. F.L.S. Per Bush	.9	6.5	4.7	1.2	4.0

Reference is made to Table No. 4. The highest per cent of R. bracteosum surviving the 1926 eradication on Lake Alice and Cheekye Creeks, was from roots, crown, and stems left in ground. There were many down logs and stumps under which R. bracteosum grew and which were impossible to completely eradicate in 1926, with the means at hand.

The roots of 3 bushes pulled and hung up in 1926 were dead in 1927 but the tips of some of the branches were in contact with moist soil and had taken root by 1927.

IV. Ecology Aspects of Ribes Data

In the preceding discussion of Ribes eradication there are of necessity certain ecological points brought out. This portion of the report is devoted to a discussion of the relation of Ribes found before and after the fire of September 30, 1925.

There are six situations on which we have data before and since the fire. These are:

1. Eradicated, not burned.
2. Eradicated, duff partially burned.
3. Eradicated, duff completely burned.
4. Not eradicated, not burned.
5. Not eradicated, duff partially burned.
6. Not eradicated, duff completely burned.

A. Data on Plot, Eradicated.

Tables No. 5 and 6 show a comparison of Ribes found on the plot and eradicated before and after the fire classified according to quadrants and to Ribes species.

Reference is made to Table No. 4. The highest per cent of
[illegible] surviving the 1936 eradication on Lake Alice and
[illegible] was from roots, crown, and stems left in ground.
There were many deep logs and stumps under which B. bracteosum grew
and which were impossible to completely eradicate in 1936, with the
means at hand.

The roots of 3 madres pulled and mapped up in 1936 were dead
in 1937 but the tips of some of the branches were in contact with moist
soil and had taken root by 1937.

10. Regular inspection of Ribes Beds

In the preceding discussion of Ribes eradication there are
of necessity certain repetitional points brought out. This portion of
the report is devoted to a discussion of the relation of Ribes found
before and after the fire of September 30, 1936.

There are six situations on which we have data before and
since the fire. These are:

1. Eradicated, not burned.
2. Eradicated, duff partially burned.
3. Eradicated, duff completely burned.
4. Not eradicated, not burned.
5. Not eradicated, duff partially burned.
6. Not eradicated, duff completely burned.

[illegible]

Tables No. 5 and 6 show a comparison of Ribes found on the
plot and eradicated before and after the fire classified according to
quadrants and to Ribes species.

TABLE NO. 5

Comparison of Number of Ribes Found and Eradicated on Cheekye Plot Before and After Fire by Quadrants

Quadrant	Ribes Found Before Fire in 1923	1924	1925	Total	Ribes Found in 1927 After Fire: Unburned	Duff Partially Burned	Duff Totally Burned	Total
N.E.	1,484	24	3	1,511	0	203	0	203
S.E.	1,857	41	9	1,907	0	1,340	15	1,355
S.W.	640	9	—	649	0	0	2	2
N.W.	803	9	4	816	0	0	3	3
Total Plots	4,784	83	16	4,883	0	1,543	20	1,563

From Table No. 5 it is apparent that those quadrants supporting the largest number of Ribes before the fire also showed the largest number of Ribes seedlings after the fire.

Ribes seedlings germinated in much greater numbers where duff was partially burned than where it was completely burned. This point will be brought out in a later table.

No Ribes seedlings were found on unburned portions.

TABLE NO. 6

Ribes Found and Eradicated on Plot Before and After Fire Classified by Species

Ribes Species	Ribes Found Before Fire In 1923	1924	1925	Total	Ribes Found in 1927 After Fire: Unburned	Duff Partially Burned	Duff Totally Burned	Total
R. sang.	4,187	62	14	4,263	0	1,541	20	1,561
R. lac.	555	20	2	577	0	2	0	2
G. div.	35	0	0	35	0	0	0	0
R. bract.	11	1	0	12	0	0	0	0
Total	4,788	83	16	4,887	0	1,543	20	1,563

Table No. 5

Comparison of Number of Mines Found and Predicted on Standing Fish Before and After Fire by Quadrats

Quadrats	Mines Found Before Fire in 1926				Mines Found in 1927 After Fire		
	1924	1925	Total	Unburned	Partially Burned	Total burned	Total
N.E.	1,468	34	1,521	0	304	0	304
S.E.	1,807	41	1,907	0	1,440	12	1,452
S.W.	640	8	648	0	8	0	8
N.W.	701	7	716	0	7	0	0
Total Fish	4,716	90	4,792	0	1,759	20	1,780

From Table No. 5 it is apparent that these quadrants supporting the largest number of Mines before the fire also showed the largest number of Mines seedlings after the fire.

Mines seedlings germinated in much greater numbers where duff was partially burned than where it was completely burned. This point will be brought out in a later table.

No Mines seedlings were found on unburned portions.

Table No. 6

Mines Found and Predicted on Fish Before and After Fire Classified by Species

Species	Mines Found Before Fire in 1926				Mines Found in 1927 After Fire		
	1923	1924	1925	Total	Unburned	Partially Burned	Total burned
L.semi.	4,107	614	141	4,862	0	1,541	20
C.lac.	565	20	4	577	0	4	0
S.liv.	35	0	0	35	0	0	0
R.brevi.	11	1	0	12	0	0	0
Total	4,718	635	145	4,897	0	1,545	20

It may be noted that there is a difference of 4 Ribes in the total of Ribes found 1923 in Table 5 and Table 6. This was due to an error in the 1923 Annual Report. It is not known which figure is correct.

It is evident from an examination of Table No. 6 that R. sanguineum occurred in greatest numbers both before and after the fire.

Only 2 R. lacustre seedlings were found after the fire. This may be due to an inability of R. lacustre seeds to remain alive following the fire, or it may be that R. lacustre takes longer to re-establish itself following a fire. A future recheck for Ribes on the plot should clear up this point.

In Table No. 7 is presented data showing the grouping in which Ribes seedlings were found. Each of the natural groupings of Ribes seedlings occupied a more or less circular area 4 feet or less in diameter and apparently represented the normal lateral spread of Ribes seed from a previously existing parent Ribes bush. Two locations containing 600 and 732 seedlings are not included in the table, because such locations occupied each on an area approximately 40 feet by 75 along an old railroad grade, where seedlings were very abundant.

TABLE NO. 7

Classification of 1927 Ribes
Locations on the Plot Based on Number of Seedlings
per Location. A Location is Defined as an Area
Four Feet or Less in Diameter

Degree Burn	Number or % of Locations	Number of Ribes per Location						Average No. Ribes per Location
		1	2-10	11-20	21-30	31-40	Total	
Duff Partially Burned	Number	10	12	5	0	2	29	7.3
	%	35%	41%	17%	0	7%	100%	
Duff Totally Burned	Number	5	4	0	0	0	9	2.2
	%	56%	44%	0	0	0	100%	
Unburned	Number	0	0	0	0	0	0	0
Total	Number	15	16	5	0	2	38	6.1
	%	40%	42%	13%	0	5%	100%	

It may be noted that there is a difference of 4 Ribes in the total of Ribes found 1932 in Table 5 and Table 6. This was due to an error in the 1932 Annual Report. It is not known which figure is correct.

It is evident from an examination of Table No. 6 that R. sanguineum occurred in greatest numbers both before and after the fire.

Only 3 R. Lacustre seedlings were found after the fire. This may be due to an inability of R. Lacustre seeds to remain alive following the fire, or it may be that R. Lacustre takes longer to re-establish itself following a fire. A future reckoning for Ribes on the plot should clear up this point.

In Table No. 7 is presented data showing the grouping in which Ribes seedlings were found. Each of the natural groupings of Ribes seedlings occupied a more or less circular area 4 feet or less in diameter and apparently represented the normal lateral spread of Ribes seed from a previously existing parent Ribes bush. Two locations containing 500 and 732 seedlings are not included in the table, because each locations occupied each on an area approximately 40 feet by 75 along an old railroad grade, where seedlings were very abundant.

TABLE NO. 7

Classification of Ribes Seedlings
Locations on the Plot Based on Number of Seedlings
per Location. A Location is Defined as an area
Four Feet or less in Diameter

Species	Number of Locations	Number of Ribes per Location					Average No. Ribes per Location
		1	2-10	11-20	21-30	31-40	Total
Definitely Burned	Number	10	12	5	0	0	7.3
	%	41%	41%	18%	0	0	100%
Probably Burned	Number	5	4	0	0	0	3.2
	%	56%	44%	0	0	0	100%
Unburned	Number	0	0	0	0	0	0
Total	Number	15	16	5	0	0	8.1
	%	44%	47%	9%	0	0	100%

The occurrence of Ribes seedlings following the fire are quite strikingly brought out in Table No. 7.

Of the 29 groupings of seedlings each presumably representing seeds from a single Ribes bush or small clump, 65% showed more than one Ribes seedling per location where the duff was partially burned. Only 44% of the groupings where the duff was completely burned showed more than one Ribes seedling per location.

There was an average of 7.3 Ribes per location where duff was partially burned, as contrasted with 2.2 Ribes per location where the burn was severe. This shows a much greater survival of Ribes seeds following a light burn.

No Ribes seedlings were found on unburned portions, although light conditions were sufficient on such portions to permit Ribes growth. This shows quite definitely the role of fire in the re-establishment of Ribes.

In Table No. 8 is shown the number of Ribes per acre on the plot before and after the fire. It was impossible to find out how many Ribes per acre occurred on a particular portion of the plot before the fire, hence the average per acre over the entire plot necessarily had to be used.

The occurrence of Ribes seedlings following the fire are quite strikingly brought out in Table No. 7.

Of the 80 groupings of seedlings each presumably representing seeds from a single Ribes bush or small clump, 65% showed more than one Ribes seedling per location where the duff was partially burned. Only 44% of the groupings where the duff was completely burned showed more than one Ribes seedling per location.

There was an average of 7.3 Ribes per location where duff was partially burned, as contrasted with 2.3 Ribes per location where the duff was severe. This shows a much greater survival of Ribes seeds following a light burn.

No Ribes seedlings were found on unburned portions, although light conditions were sufficient on such portions to permit Ribes growth. This shows quite forcibly the role of fire in the re-establishment of Ribes.

In Table No. 8 is given the number of Ribes per acre on the plot before and after the fire. It was impossible to find out how many Ribes per acre occurred on a particular portion of the plot before the fire, hence the average per acre over the entire plot necessarily had to be used.

TABLE NO. 8

Ribes Per Acre on Plot Before and After Fire

Condition	Acres	Ribes Species	Ribes Per Acre Before Fire	After Fire: Seedlings Germinating In 1925	1926	1927	Doubtful	Total Ribes Seedlings
Eradicated Unburned	1.97	R. sang.	42.49	0	0	0	0	0
		R. lac.	5.13	0	0	0	0	0
		G. div.	0.31	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total			48.04	0	0	0	0	0
Eradicated Duff Partially Burned	40.98	R. sang.	42.49	0.05	2.75	34.69	0.12	37.61
		R. lac.	5.13	0.02	0.00	0.02	0.00	0.04
		G. div.	0.31	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			48.04	0.07	2.75	34.71	0.12	37.65
Eradicated Duff Totally Burned	69.73	R. sang.	42.49	0.00	0.07	0.18	0.01	0.26
		R. lac.	5.13	0.00	0.00	0.00	0.00	0.00
		G. div.	0.31	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			48.04	0.00	0.07	0.18	0.01	0.26
Total	112.68	R. sang.	42.49	0.02	1.04	12.85	0.05	13.96
		R. lac.	5.13	0.01	0.00	0.01	0.00	0.02
		G. div.	0.31	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			48.04	0.03	1.04	12.86	0.05	13.98

Attention is called to certain points in Table No. 8.

1. On the approximate 2 acres of unburned area no Ribes were found.

2. Ribes seedlings came back in the largest number per acre on the light burn. There were found on this portion over 3/4 as many Ribes per acre as were found per acre over the plot before burning.

3. On the portion of the plot where the duff was completely burned, there was an average of only ¼ R. sanguineum per acre. The heavily burned portion occupied a good share of the south - west and northwest quadrants. Reference to Table 5 shows that these two quadrants were the lowest in Ribes content. Nevertheless

TABLE NO. 3

Ribes Per Acre of Plot Before and After Fire

Condition	Acres	Ribes Previous to Fire	Before Fire	Seedlings Germinating in 1925	Seedlings Germinating in 1926	Seedlings Germinating in 1927	After Fire Total Seedlings	Total Ribes Present
Undisturbed	1.17	N. sang.	0.17	0	0	0	0	0
Unburned		N. lac.	0.13	0	0	0	0	0
		R. div.	0.11	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total			0.52	0	0	0	0	0
Undisturbed	0.38	N. sang.	0.49	0.05	0.76	0.85	0.14	0.71
Duff		N. lac.	0.13	0.02	0.02	0.03	0.00	0.04
Partially		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.07	0.78	0.88	0.14	0.75
Undisturbed		N. sang.	0.49	0.00	0.07	0.19	0.01	0.36
Duff	0.72	N. lac.	0.13	0.00	0.00	0.00	0.00	0.00
Totally		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.00	0.07	0.19	0.01	0.36
Total	1.54	N. sang.	0.49	0.03	1.04	1.84	0.08	1.48
		N. lac.	0.13	0.01	0.00	0.01	0.00	0.02
		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.04	1.04	1.85	0.08	1.50
Undisturbed		N. sang.	0.17	0	0	0	0	0
Unburned		N. lac.	0.13	0	0	0	0	0
		R. div.	0.11	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total	1.17		0.52	0	0	0	0	0
Undisturbed	1.17	N. sang.	0.17	0	0	0	0	0
Unburned		N. lac.	0.13	0	0	0	0	0
		R. div.	0.11	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total			0.52	0	0	0	0	0
Undisturbed	0.38	N. sang.	0.49	0.05	0.76	0.85	0.14	0.71
Duff		N. lac.	0.13	0.02	0.02	0.03	0.00	0.04
Partially		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.07	0.78	0.88	0.14	0.75
Undisturbed		N. sang.	0.49	0.00	0.07	0.19	0.01	0.36
Duff	0.72	N. lac.	0.13	0.00	0.00	0.00	0.00	0.00
Totally		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.00	0.07	0.19	0.01	0.36
Total	1.54	N. sang.	0.49	0.03	1.04	1.84	0.08	1.48
		N. lac.	0.13	0.01	0.00	0.01	0.00	0.02
		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.04	1.04	1.85	0.08	1.50
Undisturbed	1.17	N. sang.	0.17	0	0	0	0	0
Unburned		N. lac.	0.13	0	0	0	0	0
		R. div.	0.11	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total			0.52	0	0	0	0	0
Undisturbed	0.38	N. sang.	0.49	0.05	0.76	0.85	0.14	0.71
Duff		N. lac.	0.13	0.02	0.02	0.03	0.00	0.04
Partially		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.07	0.78	0.88	0.14	0.75
Undisturbed		N. sang.	0.49	0.00	0.07	0.19	0.01	0.36
Duff	0.72	N. lac.	0.13	0.00	0.00	0.00	0.00	0.00
Totally		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.00	0.07	0.19	0.01	0.36
Total	1.54	N. sang.	0.49	0.03	1.04	1.84	0.08	1.48
		N. lac.	0.13	0.01	0.00	0.01	0.00	0.02
		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.04	1.04	1.85	0.08	1.50
Undisturbed	1.17	N. sang.	0.17	0	0	0	0	0
Unburned		N. lac.	0.13	0	0	0	0	0
		R. div.	0.11	0	0	0	0	0
		R. brac.	0.11	0	0	0	0	0
Total	1.17		0.52	0	0	0	0	0
Undisturbed	0.38	N. sang.	0.49	0.05	0.76	0.85	0.14	0.71
Duff		N. lac.	0.13	0.02	0.02	0.03	0.00	0.04
Partially		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.07	0.78	0.88	0.14	0.75
Undisturbed		N. sang.	0.49	0.00	0.07	0.19	0.01	0.36
Duff	0.72	N. lac.	0.13	0.00	0.00	0.00	0.00	0.00
Totally		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
Burned		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.00	0.07	0.19	0.01	0.36
Total	1.54	N. sang.	0.49	0.03	1.04	1.84	0.08	1.48
		N. lac.	0.13	0.01	0.00	0.01	0.00	0.02
		R. div.	0.11	0.00	0.00	0.00	0.00	0.00
		R. brac.	0.11	0.00	0.00	0.00	0.00	0.00
Total			0.84	0.04	1.04	1.85	0.08	1.50

Attention is called to certain points in Table No. 3.

1. On the approximate 2 acres of unburned area no Ribes were found.

2. Ribes seedlings came back in the largest number per acre on the light burn. There were found on this portion over 3/4 as many Ribes per acre as were found per acre over the plot before burning.

3. On the portion of the plot where the duff was completely burned, there was an average of only 1/3 seedling per acre. The heavily burned portion occupied a good share of the south - west and northwest quadrants. Reference to Table 5 shows that these two quadrants were the lowest in Ribes content. Nevertheless

sufficient Ribes were found on these two quadrants before the fire to ensure Ribes seed crop. The fact that these quadrants were heavily burned is probably the controlling factor in the small reestablishment of Ribes. Apparently the severe burn destroyed most of the seeds.

B. Ribes Data Surrounding Plot not Eradicated.

In 1923 Ribes data were taken on a strip one chain wide surrounding the plot just outside the circumference. The strip was divided into 180 segments. In 1927 Ribes data were taken on these same segments. Comparative data are presented in Table No. 9.

TABLE NO. 9

Ribes Per Acre on Strip One Chain Wide Not Eradicated Around Plot Before and After Fire

Condition	Acres	Ribes Species	Ribes Per Acre: Before Fire	After Fire: Bushes Surviving Fire	After Fire: Sprouts From Roots or Crown	After Fire: Seedlings Germinating In 1925	After Fire: Seedlings Germinating In 1926	After Fire: Seedlings Germinating In 1927	Total Ribes
		R. sang.	13.22	4.89	0	0	0	0	4.89
Not Eradicated	1.021	R. lac.	9.5	2.93	0	0	0	0	2.93
Not Burned		G. div.	1.37	0	0	0	0	0	0
		Total	24.09	7.82	0	0	0	0	7.83
Not Eradicated		R. sang.	129.35	4.35	25.43	0	1.85	13.04	44.57
Duff Partially	3.761	R. lac.	17.23	.92	2.37	0	1.08	0	4.37
Burned		G. div.	.08	0	0	0	0	0	0
		Total	146.66	5.17	27.80	0	2.93	13.04	48.94
Not Eradicated		R. sang.	3.08	0	.27	0	0	0	.27
Duff Totally	7.458	R. lac.	2.74	0	.27	0	0	0	.27
Burned		G. div.	.44	0	0	0	0	0	0
		Total	6.26	0	.54	0	0	0	.54
		R. sang.	42.72	1.71	7.92	0	.57	4.57	14.77
Total	12.24	R. lac.	7.76	.35	.89	0	.33	0	1.57
		G. div.	.62	.0	0	0	0	0	0
		Total	51.10	2.06	8.81	0	.90	4.57	16.34

TABLE [illegible]

Slums for Rural Areas in Tamil Nadu Cheri Wards Not Included

Annual Rate of Decline and Net Addition

Conditions	Acres	Slums Declared	Before Fire	Slums Cleared		After Fire		Slums Declared		Net Addition	
			Huts	Within Corp. Limits	Slums or Groups	Huts	Within Corp. Limits	Slums or Groups	Huts	Within Corp. Limits	Slums or Groups
At end of last year	1,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Not Improved but Improved	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Not Improved but Improved	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Not Improved but Improved	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Not Improved but Improved	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grand Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Attention is called to certain points in Table No. 9.

1. On that portion of the strip not eradicated and not burned no seedlings were found. There was only approximately 1/3 as many Ribes present as were found in 1923. No reason was apparent for this great decrease in 4 years of the Ribes population.

2. On that portion of the circular strip not eradicated and with duff partially burned, there were nearly 147 bushes per acre present before the fire. There were 5 bushes per acre surviving the fire; nearly 28 per acre from roots and crowns; and practically 16 seedlings per acre, or a total of 49 Ribes per acre after the fire. Coincidently this is approximately 1/3 the original number, which is the same as for the area not burned.

3. On that portion of the strip heavily burned and not eradicated, no seedlings were found. There was an average of 1/2 bush per acre coming up as sprouts from roots or crowns not destroyed by the fire.

4. In 1923 there were found on the strip 3 species of Ribes, namely, R. sanguineum, R. lacustre and G. divaricata. In 1927 R. sanguineum was quite well reestablished after the burn, R. lacustre was present, but there was no evidence of the reestablishment of G. divaricata.

Reference is made to certain data presented in Tables No. 8 and 9. In these tables conditions are comparable except that in Table 8 the area had been eradicated and in Table No. 9 no eradication had been done. On both areas the greatest reestablishment of Ribes occurred where the duff was partially burned. On the eradicated, partially burned area, there was an average of 37.65 Ribes seedlings per acre reestablished. On the not eradicated, partially burned area there were found practically 16 Ribes seedlings and 33 bushes surviving fire and from sprouts per acre.

The conclusion from such data is that eradication previous to the fire had no effect on the reestablishment of Ribes by seedlings. The only difference was the reestablishment of Ribes by bushes surviving fire and sprouts from crowns and roots on the area not eradicated.

V. Examination of Planted Pines

The pines planted on the 8 radii in the spring of 1926 were checked for survival and signs of blister rust in October, 1927.

A. Survival of Pines Planted in 1926

Table No. 10 shows the survival of pines planted in the spring of 1926.

Attention is called to certain points in Table No. 9.

1. On that portion of the strip not eradicated and not burned no seedlings were found. There was only approximately 1/5 as many Ribes present as were found in 1928. No reason was apparent for this great decrease in 4 years of the Ribes population.

2. On that portion of the circular strip not eradicated and with duff partially burned, there were nearly 147 bushes per acre present before the fire. There were 3 bushes per acre surviving the fire; nearly 88 per acre from roots and crowns; and practically 10 seedlings per acre, or a total of 43 Ribes per acre after the fire. Coincidently this is approximately 1/3 the original number, which is the same as for the area not burned.

3. On that portion of the strip heavily burned and not eradicated, no seedlings were found. There was an average of 1/3 bush per acre coming up as sprouts from roots or crowns not destroyed by the fire.

4. In 1928 there were found on the strip 3 species of Ribes, namely, R. <u>sericeum</u>, R. <u>lacustre</u> and R. <u>divaricata</u>. In 1932 R. <u>sericeum</u> was quite well reestablished after the burn, R. <u>lacustre</u> was present, but there was no evidence of the reestablishment of R. <u>divaricata</u>.

Reference is made to certain data presented in Tables No. 8 and 9. In these tables conditions are comparable except that in Table 8 the area had been eradicated and in Table No. 9 no eradication had been done. On both areas the greatest reestablishment of Ribes occurred where the duff was partially burned. On the eradicated, partially burned area, there was an average of 47.65 Ribes seedlings per acre reestablished. On the not eradicated, partially burned area there were found practically 16 Ribes seedlings and 33 bushes surviving fire and from sprouts per acre.

The conclusion from such data is that eradication previous to the fire had no effect on the reestablishment of Ribes by seedlings. The only difference was the reestablishment of Ribes by bushes surviving fire and sprouts from crowns and roots on the area not eradicated

3. Inoculation of Planted Pines

The pines planted on the 8 rests in the spring of 1928 were checked for survival and signs of blister rust in October, 1932.

1. Survival of Pines Planted in 1928

Table No. 10 shows the survival of pines planted in the spring of 1928.

TABLE NO. 10

Survival in October 1927 of Pines Planted in May, 1926, Cheekye Plot

Radius	Length	Pines Planted Spring 1926	Pines Surviving Fall 1927	Per Cent Survival
N.	35 ch.	771	711	92%
N.E.	29 ch.	640	562	88%
E.	24 ch.	528	457	87%
S.E.	30 ch.	660	549	83%
S.	26 ch. 24'	515	423	82%
S.W.	30 ch.	660	460	70%
W.	25 ch.	477	374	78%
N.W.	33 ch.	736	609	84%
Total		4,977	4,144	83%

B. Infection of Planted Pines.

Table No. 11 gives a summary of infection of planted pines found in October, 1927. The pines surviving the fire were all located near the outer edges of the plot.

Table No. 10

Survival in October 1927 of Pines Planted in May 1926.

Dunlop Plot

Section	Length	Pines Planted Spring 1926	Pines Survive- Fall 1927	Per Cent Survival
A.	40 ch.	771	711	88%
A.1.	80 ch.	640	561	81%
B.	36 ch.	624	457	67%
B.1.	40 ch.	640	546	85%
C.	80 ch.	748	488	65%
C.1.	40 ch.	660	480	72%
D.	80 ch.	1,277	974	76%
D.1.	1 ch.	748	572	76%
Total		6,177	4,144	67%

4. Infection of Planted Pines.

Table No. 11 gives a summary of infection of planted pines found in October, 1927. The 4 lines surviving the fire were all located near the outer edges of the plot.

TABLE NO. 11

Summary of Planted Pine Infection Cheekye Plot, October, 1927

Radius	Pines Planted Previous to and Surviving Fire			Pines Planted 1926 After Fire					
					Number Infected				
	No. Left After Fire	No. Infected	Per Cent Infected	Number Planted	On Plot	Off Plot	Infection Doubtful	Per Cent Infected	Per Cent Doubtful
N.	0	0	0	711	3	8	1	1.5%	.1%
N.E.	0	0	0	562	2	1	1	.5%	.2%
E.	44	11	25%	457	2	0	2	.4%	.4%
S.E.	0	0	0	549	1	0	0	.2%	0
S.	3	2	67%	422	1	0	0	.2%	0
S.W.	0	0	0	460	1	0	0	.2%	0
W.	3	0	0	374	7	2	5	2.3%	1.3%
N.W.	0	0	0	609	6	4	4	1.6%	.7%
Total	50	13	26%	4,144	25	15	13	.9%	.3%

Table No. 11

Summary of Tuberculosis Inspection Under Milk and Dairies Order, 1926

| Name of Authority | Cows and other milch animals on premises at time of inspection | | | | | | Cows and other milch animals found diseased on inspection | | | | | | Cows and other milch animals found diseased on inspection and dealt with under Section 3 of the Order | | | | | | Cows and other milch animals found diseased on inspection and dealt with under Section 4 of the Order | | | | | | Cows and other milch animals found diseased on inspection and dealt with under Section 5 of the Order | | | | | | Cows and other milch animals found diseased on inspection and dealt with under Section

In Table No. 12 is shown the location of infected pines on the plot planted in May, 1926 and examined in October, 1927.



In Table No. 11 is shown the location of infected pines on the plot planted in May, 1936 and examined in October, 1937.

TABLE NO. 12

Record of Infection of Pines Planted on the Plot Spring 1926
Cheekye, October, 1927

N. Rad.		N.E. Rad.		E. Rad.		S.E. Rad.		S. Rad.		S.W. Rad.		W. Rad.		N.W. Rad.	
Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)	Pine No.	Dist. from Cir. (Ft.)
4-12	350	11-13	485	6-6	856	5-7	913	18-6	44	4-11	955	8-10	692	2-3	1,109
17-21	65	16-22	128	8-11	689							8-19	665	10-6	572
18-4	50											9-3	603	11-3	515
												11-3	515	16-14	152
												13-8	368	17-7	107
												13-12	356	18-9	35
												13-15	347		

909

TABLE NO. 13

Income of Interest of Other Classes of the Total Population

Specified Occupations, 1931

(Net Income)

Occupation	Total Number	Total Income	Interest on Mortgages	Interest on Bonds	Interest on Bank Deposits	Interest on Other Investments	Total Interest	Interest as Percent of Total Income
Bankers	1,234	$ 4,515,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 4,000	0.1
Brokers	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Clergymen	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Dentists	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Engineers	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Farmers	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Lawyers	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Physicians	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Teachers	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1
Veterinarians	1,234	4,515,000	1,000	1,000	1,000	1,000	4,000	0.1

In Table No. 13 is shown in a comparative way information on infection of pines planted and examined before and after the fire.



In Table No. 10 is shown in a comparative way information on interiors of pipes painted and examined before and after the fire.

TABLE NO. 13

Comparison on the Plot of Infection of Pines Planted Previous to Fire and Examined Spring 1925, With Infection of Pines Planted Since Fire and Examined Fall 1927

Radius	Infection Previous to Fire			Infection Since Fire		
	Pines Infected		Ave. Distance Infected	Pines Infected		Ave. Distance Infected
	Number	%	Pines from Circum. in Ft.	Number	%	Pines from Circum. in Ft.
N.	8	1.4%	690	3	.7%	355
N.E.	12	2.1%	636	2	.5%	307
E.	30	5.1%	457	2	.5%	768
S.E.	15	2.5%	764	1	.2%	916
S.	12	2.2%	468	1	.2%	44
S.W.	4	.9%	848	1	.2%	956
W.	5	1.1%	702	7	1.8%	507
N.W.	7	1.4%	521	6	1.4%	415
Total	93	2.2%	585	23	.7%	443

609

TABLE XCV.—(2)

Comparison on the plan of Induction (1898, 1899) between Married Persons in Dwellings and Persons living in Institutions, &c.

Number and Condition of Persons aged 15 and upwards.

Condition.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
	Persons in Dwellings.		Persons in Institutions, &c.		Total.	
Married	1,444,000	48·14	3,000	1·00	1,447,000	48·24
Not Married	1,556,000	51·86	297,000	99·00	1,853,000	61·76
Total	3,000,000	100·00	300,000	100·00	3,300,000	110·00

Certain facts are brought out in Table No. 13.

1. The east and southeast radii showed the greatest number of infected pines before the fire. Since the fire infection was greatest on the west and northwest radii, with a small amount of infection on the east and southeast radii.

This condition is probably the result of two factors (1) In the spring of 1926 nearly 19,000 feet of live stem of R. bracteosum was eradicated from Cheekye and Lake Alice Creek northeast and east of the plot 1/2 to 1-1/2 miles away. This action removed an important source of Ribes infection affecting the east radius. (2) The fire of September 30, 1925 cleared a wide path northwest of the plot without destroying the R. bracteosum occurring along Squamish and Cheakamus rivers a mile or mile and a half northwest of the plot. These two conditions would naturally result in an increased amount of pine infection on the western portion of the plot.

Furthermore, it must be borne in mind that the cool, moist night winds in this region normally come from the north from the rapidly cooling land towards Howe Sound.

2. The fact that there is a smaller number of pines infected since the fire than before, is insignificant, when it is considered that the pines planted in 1926 had been exposed only 17 months as against 24 months for the pines planted before the fire.

3. It is not believed that the small Ribes seedlings found in the spring of 1927 were a factor in causing infection of the planted pines. The infection apparent on the pines must necessarily have come from Ribes in the summer and fall of 1926. By far the greatest number of seedlings found were of 1927 germination, and the few Ribes of 1925 and 1926 germination existing in the summer of 1926 must have been nearly negligible in their effect on pines.

4. The average distance of infected pines from the circumference of the plot was much less since the fire than before the fire.

An example of the effect of Ribes growing close to a planted pine occurred on the north radius outside of the plot. The pine was 4/10 of a foot high. A R. sanguineum bush 2 feet high, and having approximately 10 feet of live stem was located 2 feet west of the pine. The pine had 4 juvenile cankers on 1925 year of growth. The next planted pine, 3 feet away, had 1 canker.

Certain facts are brought out in Table No. 13.

1. The east and southeast radii showed the greatest number of infected pines before the fire. Since the fire infection was greatest on the west and northwest radii, with a small amount of infection on the east and southeast radii.

This condition is probably the result of two factors (1) In the spring of 1932 nearly 12,000 feet of live stem of P. ponderosa was eradicated from Cheesive and Lake Alice Creek northeast and east of the plot 1/2 to 1-1/2 miles away. This action removed an important source of Ribes infection affecting the east radius. (2) The fire of September 30, 1932 cleared a wide path northwest of the plot without destroying the P. ponderosa occurring along Spearish and Cheesman rivers a mile or mile and a half northwest of the plot. These two conditions would naturally result in an increased amount of pine infection on the western portion of the plot.

Furthermore, it must be borne in mind that the cool, moist night winds in this region normally come from the north from the rapidly cooling land towards Mowe Sound.

2. The fact that there is a smaller number of pines infected since the fire than before, is insignificant, when it is considered that the pines planted in 1932 had been exposed only 17 months as against 24 months for the pines planted before the fire.

3. It is not believed that the small Ribes seedlings found in the spring of 1927 were a factor in causing infection of the planted pines. The infection apparent on the pines must necessarily have come from Ribes in the summer and fall of 1926. By far the greatest number of seedlings found were of 1927 germination, and the few Ribes of 1928 and 1926 germination existing in the summer of 1932 must have been nearly negligible in their effect on pines.

4. The average distance of infected pines from the circumference of the plot was much less since the fire than before the fire.

An example of the effect of Ribes growing close to a planted pine occurred on the north radius outside of the plot. The pine was 4/10 of a foot high. A P. ponderosa bush 3 feet high, and having approximately 10 trees of five stem was located 3 feet west of the pine. The pine had 4 internode centers on 1932 year of growth. The next planted pine, 8 feet away, had 1 center.

VI. Summary

1. In May, 1927, Cheekye Plot was gone over for Ribes for the first time since the fire of 1925. No Ribes other than 1561 seedlings of R. sanguineum and 2 of R. lacustre were found on the plot. These seedlings were predominantly of 1927 germination.

2. Cheekye and Lake Alice creeks, which were gone over for R. bracteosum in spring of 1926, were rechecked in the spring of 1927. An efficiency of 92.1% by number and 98.7% by feet of live stem was found to have been obtained in 1926.

3. The plot at Cheekye offered an excellent opportunity for a Ribes ecological study, since we have Ribes data before and after the fire on eradicated and not eradicated areas.

4. On neither the eradicated nor not eradicated areas were Ribes seedlings found on unburned land.

5. The area on which duff was partially burned showed the greatest re-establishment of Ribes seedlings, both on eradicated and not eradicated areas.

6. The areas where duff was completely burned showed only a very few Ribes seedlings.

7. Apparently Ribes eradication previous to the fire had no effect on the re-establishment of Ribes seedlings following the fire.

8. The west and northwest radii showed the greatest number of infected pines of those planted and examined since the fire, while pines planted and examined before the fire showed the largest number infected on the east and southeast radii. This situation may be due to (1) destruction of R. bracteosum east and northeast of the plot; and (2) opening up of a wide path by the fire northwest of the plot, thus exposing the planted pines to infection from R. bracteosum northwest of the plot.

VII. Recommendations for Future Work

It is recommended that future work at Cheekye be along the following lines:

A. Recheck plot for Ribes spring of 1928.

B. Periodic examination of planted pines 1928 and each year for several years thereafter.

VI. Summary

1. In May, 1937, Cheekye plot was seen over for Ribes for the first time since the fire of 1923. No Ribes other than 1931 seedlings of R. *acuminatum* and S of R. *lacustre* were found on the plot. These seedlings were produced early of 1937 germination.

2. Cheekye and Lake Alice creeks, which were gone over for R. *bracteosum* in spring of 1936, were reobserved in the spring of 1937. An efficiency of 89.1% by number and 98.7% by feet of live stem was found to have been obtained in 1936.

3. The plot at Cheekye offered an excellent opportunity for a Ribes ecological study, since we have Ribes data before and after the fire on predicted and not predicted areas.

4. On neither the predicted or not predicted areas were Ribes seedlings found on unburned land.

5. The area on which duff was partially burned showed the greatest re-establishment of Ribes seedlings, both on predicted and not predicted areas.

6. The areas where duff was completely burned showed only a very few Ribes seedlings.

7. Apparently Ribes predication previous to the fire had no effect on the re-establishment of Ribes seedlings following the fire.

8. The west and northwest radii showed the greatest number of infected plans of those planted and examined since the fire, while plans planted and examined before the fire showed the largest number infected on the east and southeast radii. This situation may be due to (1) infection of R. *bracteosum* west and northwest of the plot; and (2) opening up of a wide path by the fire northwest of the plot, thus exposing the planted plans to infection from R. *bracteosum* northwest of the plot.

VII. Recommendations for Future Work

It is recommended that future work at Cheekye be along the following lines:

A. Reobserve plot for Ribes spring of 1938.

B. Periodic examination of planted plans 1939 and each year for several years thereafter.

EDUCATIONAL REPORT 1927

By

C. R. Stillinger
Associate Pathologist

I. Introduction

The educational project is one of the most important projects of the blister rust problem since the support and advancement of the problem depends upon the knowledge which the general public as well as the particular owners of white pine have of the problem. As in the past, the larger part of the leaders time has been taken up with other work and for this reason not as much progress has been made as is desirable.

II. Purpose of the Project

The purpose of the project is to disseminate information regarding the blister rust problem by all of the usual means employed in general publicity work.

III. Summary of Work

A. Western Blister Rust News Letter.

This newsletter is issued to all regular permanent employees of the Western Office as well as to a considerable number of eastern employees. The letter is issued monthly, twelve numbers having been issued during the last fiscal year. The mailing list consists of 59 names. A few extra copies are prepared for the files so that approximately 75 copies are prepared each month. The material in the news letter is confidential, consisting of preliminary reports on the progress of the work and news of interest to all employees. On an average this letter is 9 to 11 pages in length. This letter has now completed its first complete year. About 50 per cent of the material for the news letter has been articles provided by blister rust employees. Of the 114 pages of this news letter issued during the year the following number of pages were contributed by individuals: Offord 4¼, Calhoun 3¾, Rockie 3¾, Root 5¼ Strong ¾, Lachmund ⅝, Detwiler 3½, Putnam 4¾, Bedwell ¼, Riley 1¼, Myers 1½, Wyckoff 2, Goodding 5¾. Partington 1, Benedict 2, Bell ¼.

B. Summer News Letter.

During the past year another news letter for all temporary employees was started. The object of this news letter is to give to all employees current information regarding the different phases of the blister rust work as well as supply them with the more fundamental facts regarding the work, so that by the time they leave the work they will be fairly coversant with the entire blister rust problem.

I. Introduction

The educational project is one of the most important projects of the blister rust problem since the support and advancement of the problem depends upon the knowledge which the general public as well as the particular owners of white pine have of the problem. As in the past, the larger part of the leaders time has been taken up with other work and for this reason not as much progress has been made as is desirable.

II. Purpose of the Project

The purpose of the project is to disseminate information regarding the blister rust problem by all of the usual means employed in general publicity work.

III. Summary of Work

A. Blister Rust News Letter.

This news letter is issued to all regular permanent employees of the Western Office as well as to a considerable number of eastern employees. The letter is issued monthly, twelve numbers having been issued during the last fiscal year. The mailing list consists of 58 names. A few extra copies are prepared for the files so that approximately 75 copies are prepared each month. The material in the news letter is confidential, consisting of preliminary reports on the progress of the work and news of interest to all employees. On an average this letter is 9 to 11 pages in length. This letter has now completed its first complete year. About 80 per cent of the material for the news letter has been articles provided by blister rust employees. Of the 114 pages of this news letter issued during the year the following number of pages were contributed by individuals: Offord 4½, Calhoun 3½, Beckie 3½, Root 5½ Strong 3, Isenmund 4, Detwiler 5½, Putnam 4½, Bedwell 4, Riley 1½, Myers 1½, Wyckoff 3, Goodding 5½, Partington 1, Benedict 3, Bell 4,

B. Other Press Letter.

During the past year another news letter for all temporary employees was started. The object of this news letter is to give to all employees current information regarding the different phases of the blister rust work as well as supply them with the more fundamental facts regarding the work, so that by the time they leave the work they will be fairly conversant with the entire blister rust problem.

The blister rust information is interspersed with articles from men giving their impressions of the work either in prose or poetry. Humorous happenings of general interest are also issued. This type of material is interspersed with blister rust information in order that the letter may be made as interesting as possible. No index is used in order to force the reader to peruse the entire letter.

Very good cooperation has been obtained from the majority of the permanent employees in either obtaining articles or writing articles for this letter. As a result abundant material has been available for each issue and a very creditable letter was issued. However, there is need for more data regarding our work, compiled in a concise form, for use in this letter.

The letter averages about twenty pages. It was distributed to a mailing list of approximately 285. Extras were prepared for filing so that about 325 copies of this news letter were prepared for each issue.

The first letter, issued about June 15th, gave a general outline of the seasons work. The second on July 15th and third on August 15 gave a summary of the progress of the work. The fourth in October gave a preliminary summary of the seasons results.

This letter as indicated from the reports received from the field was a worth while undertaking and undoubtedly developed interest in our work. For this reason it should be continued.

One more news letter should be issued giving a summary of all reports on the work based on our annual report. This final Summer News Letter should be sent to not only all the past seasons employees but to all of our employees of the past. If this is done it will be necessary to develop and keep up to date a permanent mailing list of all temporary employees. Further this summary should be sent out to all of our mailing list.

Since summaries of this type have not been issued before, it is recommended that a general summary of all of our work should be issued to our general mailing list. This can probably be done by issuing a summary of each project at a time, since a summary of all of the projects would be a rather voluminous letter.

C. Talks and Papers.

During the year the following talks and papers have been issued;

"Problems in the Development of Blister Rust Control"
S.B. Detwiler, Western Blister Rust Conference, November 4, Portland, Oregon.

"A Field Key to the Common Woody Plants of Northern Idaho"
C. C. Epling, Mimeographed, May, 1927.

"The Quarantine Phase of White Pine Blister Rust"— C.R. Stillinger Western Plant Quarantine Board, Reno, Nevada, June 21.

Western Plant Quarantine Board, Reno, Nevada, June 8,

"The Quarantine Phase of White Pine Blister Rust"— C.E. Stilling
C. C. Bolting, Mimeographed, May, 1927.

"A Field Key to the Common Woody Plants of Northern Idaho"
Portland, Oregon.

E.E. Detwiler, Western Blister Rust Conference, November 4,
"Problems in the Development of Blister Rust Control"

During the year the following talks and papers have been
issued:

7. Talks and Papers.

projects would be a rather voluminous letter.

ing a summary of each project as a time, minus a summary of all of the
issued to our general mailing list. This can probably be done by issu-
is recommended that a general summary of all of our work should be
Since summaries of this type have not been issued before, it

ing list.
employees. Further this summary should be sent to all of our mail-
to develop and keep up to date a permanent mailing list of all temporary
all of our employees of the past. If this is done it will be necessary
letter should be sent to not only all the past seasons employees but to
reports on the work based on our annual report. This final Summer News
One more news letter should be issued giving a summary of all

in our work. For this reason it should be continued.
field was a work while undertaking and undoubtedly developed interest
This letter as indicated from the reports received from the

gave a preliminary summary of the seasons results.
15 gave a summary of the progress of the work. The fourth in October
line of the seasons work. The second on July 15th and third on August
The first letter, issued about June 15th, gave a general out-

issue.
so that about 350 copies of this news letter were prepared for each
to a mailing list of approximately 325. Extras were prepared for filing

The letter averages about twenty pages. It was distributed

for use in this letter.
in need for more data regarding our work, compiled in a concise form
for each issue and a very creditable letter was issued. However, there
the permanent employees in either obtaining articles or writing articles
for this letter. As a result excellent material has been available

Very good cooperation has been obtained from the majority of

der is used in order to force the reader to peruse the entire letter.
order that the letter may be made as interesting as possible. No in-
type of material is interspersed with blister rust information in
poetry. Humorous happenings of general interest are also issued. This
from men giving their impressions of the work either in prose or

The blister rust information is interspersed with articles

"White Pine Blister Rust"--C. R. Stillinger, Northwest Association of Horticulturists, Entomologist and Plant Pathologists, Pullman, Washington, June 28, 1927.

"The Control of White Pine Blister Rust,"--C. R. Stillinger, Abstract published in Northwest Service.

"Practical Application of Forest Conservation"--C. G. Strong, before manual training instructors of city schools of Spokane and before Questers Club. Both of these were given during forestry week.

"Blister Rust Control in the Inland Empire"--S. N. Wyckoff, at meeting of Lumbermen and Foresters, Spokane, Washington, December 30, 1927.

"Control of White Pine Blister Rust in the West"--S. N. Wyckoff, Western Plant Quarantine Board, Reno, Nevada, June 21, 1927.

"Summary of Blister Rust Control in the Far West"--S. N. Wyckoff, Western Blister Rust Conference, November 4, Portland, Oregon.

"Local White Pine Forests Menaced by White Pine Blister Rust"-Article I.

"The Life History of White Pine Blister Rust and How it Grows and Spreads.--Article II.

"The Program for Control of White Pine Blister Rust"--Article III.

"The Eradication of Cultivated Black Currants Necessary to Control White Pine Blister Rust"--Article IV.

"Importance of Quarantine Laws in Controlling White Pine Blister Rust"--Article V.

"Local Control of White Pine Blister Rust"--Article VI. These six articles written by S. N. Wyckoff were printed in the Spokane Daily Chronicle during summer 1927.

"Present Status of White Pine Blister Rust in Inland Empire"--C. R. Stillinger, Northwest Scientific Association, December 29.

"White Pine Blister Rust" by Clifford in Farm Trio, August, 1927.

"The Problem of Blister Rust Control in California"--Mr. Wyckoff and Mr. Root, Monthly Bulletin of State Department of Agriculture of California, May, 1927.

"The White Pine Blister Rust Problem"--Strong and Putnam, given before the Forestry student body on March 9 and 10 at the University of Idaho and Washington State College.

"White Pine Blister Rust in West"--Article in the DeMolay magazine for June.

Reports of the progress of the cooperative blister rust control work with the fire protective associations of northern Idaho have been issued each month to the secretary of each association. Copies of these have in turn been distributed by the secretary to the members of the association. Reports on the progress of the blister rust problem have been given by Mr. Wyckoff at each of the four quarterly meetings of the Northern Idaho Forestry Association in Spokane, Washington.

"White Pine Blister Rust"--C. R. Stillinger, Northwest
Association of Horticulturists, Montmorgiest and Plant
Pathologists, Pullman, Washington, June 28, 1927.
"The Control of White Pine Blister Rust."--C. R. Stillinger,
Abstract published in Northwest Service.
"Practical Application of Forest Conservation"--C. O. Strobe,
before manual training instructors of city schools of Spokane
and before Chamber Club. Both of these were given during
Forestry week.
"Blister Rust Control in the Inland Empire"--S. N. Wyckoff,
at meeting of Lumbermen and Foresters, Spokane, Washington,
December 30, 1927.
"Control of White Pine Blister Rust in the West"--S. N. Wyckoff
Western Plant Quarantine Board, Reno, Nevada, June 21, 1927.
"Summary of Blister Rust Control in the Far West"--S. N. Wyckoff
Western Blister Rust Conference, November 4, Portland, Oregon
"Local White Pine Forests Menaced by White Pine Blister Rust"--
Article I.
"The Life History of White Pine Blister Rust and How it Grows
and Spreads."--Article II.
"The Program for Control of White Pine Blister Rust"--Article I
"The Eradication of Cultivated Black Currants Necessary f
Control White Pine Blister Rust"--Article IV.
"Importance of Quarantine Laws in Controlling White Pine
Blister Rust"--Article V.
"Local Control of White Pine Blister Rust"--Article VI.
These six articles written by S. N. Wyckoff were printed in
the Spokane Daily Chronicle during summer 1927.
"Present Status of White Pine Blister Rust in Inland Empire"--
C. R. Stillinger, Northwest Scientific Association, December
"White Pine Blister Rust" by Clifford in Farm Life, August, 192
"The Problem of Blister Rust Control in California"--Mr.
Wyckoff and Mr. Boot, Recently Pathologists of State Departments
of Agriculture of California, May, 1927.
"The White Pine Blister Rust Problem"--Strong and Putnam, given
before the Forestry students body on March 9 and 10 at the
University of Idaho and Washington State College.
"White Pine Blister Rust in West"--Article in the Ecology maga-
zine for June.

Reports of the progress of the cooperative blister rust control work with the fire protective associations of northern Idaho have been issued each month to the secretary of each association. Copies of these have in turn been distributed by the secretary to the members of the association. Remarks on the progress of the blister rust problem have been given by Mr. Wyckoff at each of the four quarterly meetings of the Northern Idaho Forestry Association in Spokane, Washington.

Various other briefer articles have appeared in the various papers and reports of the several states so that during the last year satisfactory publicity has been given in the western states.

Mimeographed questions and answers have been used quite extensively in Oregon, Washington and California. Approximately 1000 copies have been distributed in each state.

D. Pictures of Field Work.

Visual education is now recognized as the most effective method for presenting information to the general public. Since very little material for this purpose had been assembled during the progress of the work in the West, due to lack of time, equipment and ability to do this work, the development of this phase of the educational work was given special attention during the past year and as the educational project leader has come in contact with each project he has endeavored to obtain satisfactory pictures of the work. Also individuals who were working on the projects and who seemed able to take good pictures were encouraged to take pictures of our work during the summer.

Since official equipment to do photographic work was not available during the past season, the photographic work was done with the personal equipment of the project leader. In September this project was supplied with a 5"x7" camera and equipment, which although considerably heavier than the Eastman equipment and much more cumbersome, will be satisfactory for this work.

Equipment for all the kinds of copy work which is required in the blister rust work has been built so that this project is now equipped to meet most of the photographic needs of blister rust work. Since in the copy work there is a considerable demand for 8"x10" prints of maps, charts, etc., for the various reports, it is desirable that an 8"x10" camera box should be provided for this work. The lenses which are on hand with the 5"x7" camera can be used with this larger camera box. Since it is also expected that considerable microphotographic work will be done in the detailed studies on Ribes and because considerable other photographic work on the other projects will be done, it is desirable that a small dark room be provided. The saving in time and expense would soon pay for the small expense necessary to equip a dark room.

The one contingent upon whether the photographic work should be developed is that an individual be available who is capable of doing the work. This is a highly specialized type of work andrequires considerable experience before it can be handled satisfactorily. The present educational project leader has acquired considerable experience in this type of work during a period of fifteen years.

During the past season about 375 good photographs have been added to the office files. All negatives have been numbered and filed consecutively in a negative preserver with full data typewritten upon it. Also large 8½x11" envelopes with a print and the legend on the outside have been prepared for this office and one set for the Washington Office. This file is arranged according to projects.

Various other briefer articles have appeared in the various papers and reports of the several states so that during the last year satisfactory publicity has been given in the western states.

Mimeographed questions and answers have been used quite extensively in Oregon, Washington and California. Approximately 1000 copies have been distributed in each state.

I. Pictures of Field Work.

Visual education is now recognized as the most effective method for presenting information to the general public. Since very little material for this purpose had been assembled during the progress of the work in the West, due to lack of time, equipment and ability to do this work, the development of this phase of the educational work was given special attention during the past year and as the educational projects in charge became in contact with each project he was endeavored to obtain satisfactory pictures of the work. Also individuals who were working on the projects and who seemed able to take good pictures were encouraged to take pictures of our work during the summer.

Since official equipment to do photographic work was not available during the past season, the photographic work was done with the personal equipment of the project leader. In September this project was supplied with a 3¼" camera and equipment, which although considerably heavier than the Eastman equipment and much more cumbersome, will be satisfactory for this work.

Equipment for all the kinds of copy work which is required in the pilster rust work has been built so that this project is now equipped to meet most of the photographic needs of pilster rust work. Since in the copy work there is a considerable demand for 8"x10" prints of maps, charts, etc., for the various reports, it is desirable that an 8"x10" camera box should be provided for this work. The lenses which are on hand with the 5"x7" camera can be used with this larger camera box. Since it is also expected that considerable photomicrographic work will be done in the detailed studies on Ribes and because considerable other photographic work on the other projects will be done, it is desirable that a small dark room be provided. The saving in time and expense would soon pay for the small expense necessary to equip a dark room.

The one contingent upon whether the photographic work should be developed is that an individual be available who is capable of doing the work. This is a highly specialized type of work and requires considerable experience before it can be handled satisfactorily. The present educational project leader has acquired considerable experience in this type of work during a period of fifteen years.

During the past season about 375 good photographs have been added to the office files. All negatives have been numbered and filed consecutively in a negative preserver with full data typewritten upon it. Also large 8½x11" envelopes with a print and the legend on the outside have been prepared for this office and one set for the Washington office. This file is arranged according to projects.

The following table gives a summary of the number of pictures acquired for each project:

TABLE NO. 1

Pictures Acquired During Past Year

Project	5" x7"	4" x5"	3¼" x4¼"	2B	3A
Ribes Eradication in Idaho	45	9	4	--	--
" " California	15	2	--	--	--
Chemical Eradication	19	9	4	--	--
Ribes Pictures	57	10	11	--	--
Black Currant Eradication	15	--	3	--	--
White Pine	21	3	3	2	--
Sugar Pine	20	3	11	--	--
Ecology	11	20	--	--	40
Blister Rust	17	--	19	--	--
Reconnaissance	3	1	1	--	--
Total	223	57	56	2	40

The 4"x5", 2B and 3A sizes were taken by other members of the office.

After obtaining a series of pictures of each project, the project leader has been supplied with a complete set for use in the field in all contacts which he has made.

These pictures will now make it possible to develop sets of lantern slides to illustrate different phases of our work. The development of these sets should be done this winter, the slides prepared and lists of available sets issued to all project leaders.

Another project made possible is that of the development of pictures albums for the use of project leaders in their camps, in school, city libraries, etc. This project has been started in cooperation with Mr. Root, State Leader in California. He has been provided with the necessary pictures and will soon have ready a preliminary draft. A similar project should be developed with each state leader. Not enough pictures are available to do this for each state, but an effort should be made to obtain these during the next season.

E. Demonstration Boxes.

Two years ago a small substantial box 6½x9x1¾" containing blister rust specimens, a diagram of the disease and a circular regarding the work was designed. The purpose of this box was for the use of project leaders, black currant men, state inspectors and county agricultural agents. All who have seen these have requested some of them. However, for lack of time it has not been possible to prepare these and fill the orders which have been received. A sufficient number of these should be prepared during this next year so that the individuals for whom they were planned can be supplied with

The following table gives a summary of the number of pictures required for each project:

Table No. 1

Pictures required during Past Year

Project	5" x 7"	4" x 5"	3½" x 4½"	2½"	2" x 2"
Slope profile line in Libo	45	9	4	---	---
" " California	15	3	---	---	---
Chemical reaction	19	9	4	---	---
Rime pictures	87	10	11	---	---
Micro Current Predictables	15	---	4	---	---
White Film	23	5	4	1	---
Paper Film	46	9	11	---	---
Leader	11	30	---	---	40
Plaster Work	17	---	12	---	---
Decorations	6	1	1	---	---
Total	284	87	60	1	40

The 4"x5", 2½ and 3¼ sizes were taken by other members of the office.

After obtaining a series of pictures of each project, the project leader has been supplied with a complete set for use in the field in all contests which be has made.

These pictures will now make it possible to develop sets of lantern slides to illustrate different phases of our work. The development of these sets should be done this winter, the slides prepared and lists of availablesets issued to all project leaders.

Another project made possible is that of the development of picturealbums for the use of project leaders in their camps, in school, city libraries, etc. This project has been started in cooperation with Mr. Root, State Leader in California. He has been provided with the necessary pictures and will soon have ready a preliminary draft. A similar project should be developed with each state leader. Not enough pictures are available to do this for each state, but an effort should be made to obtain these during the next season.

K. Demonstration Boxes.

Two years ago a small substantial box 6½x8½" containing pfister rust specimens, a diagram of the disease and a circular regarding the work was designed. The purpose of this box was for the use of project leaders, black currant men, state inspectors and county agricultural agents. All who have seen these have requested some of them. However, for lack of time it has not been possible to prepare these and fill the orders which have been received. A sufficient number of these should be prepared during this next year so that the individuals for whom they were planned can be supplied with

them.

F. Educational Work In Different Projects.

The educational work among employees, other than that by means of the Summer News Letter, has been left largely to the project leader. However, suggestions were given to these leaders from time to time and material provided for their use. All employees on the eradication project who were assembled in Spokane before going to camp were given a talk on blister rust illustrated with lantern slides, before they left for the field. Demonstrations were placed in the camp on the general field day when all of these men assembled in one camp. As far as known all project leaders gave talks to their men at every occasion when they were assembled in groups. More effort should be given by the leader of the educational project to the better organization of this work and the preparation of talks for these group meetings so that this work may be better standardized.

During the early spring Mr. Strong and Mr. Melis sent to all the former employees on our eradication work a summary of the previous season's work.

G. Educational Work In Individual States.

This work has been handled directly by the state leaders in each state. A report of the work done by these men will be found in connection with the individual state reports. An effort is made by the leader of the educational project to work in close cooperation with each state leader giving suggestions and supplying materials. Due to the interference of quarantine work not enough time has been available to be as helpful to the state leaders as should be possible in this work.

Specimens prepared in the usual way, pictures and lantern slides have been provided as fast as they were available. During the next season an effort should be made to develop a blister rust picture album for the use of the state leaders. The preparation of one for California has been started in cooperation with Mr. Root.

Besides supplying the state leaders with small lots of mounted specimens and literature, a set of the best pictures available of our western work at the time was submitted to each for selection of pictures for lantern slides. A set of from 24 to 36 pictures was made by each state leader. The negatives were sent to Washington, the slides prepared and colored so that this year for the first time slides of our western work are in the possession of each of our state leaders.

IV. Recommendations

1. That the regular news letter to be continued.
2. That the Summer News Letter be further developed and the

them.

E. Educational Work in Different Projects.

The educational work among employees, other than that by means of the Summer News Letter, has been left largely to the project leader. However, suggestions were given to these leaders from time to time and material provided for their use. All employees on the eradication project who were assembled in Spokane before going to camp were given an talk on Blister Rust illustrated with lantern slides, before they left for the field. Demonstrations were placed in the camp on the general field day when all of these men assembled in one camp. As far as known ALL project leaders gave talks to their men at every occasion when they were assembled in groups. More effort should be given by the leader of the educational project to the better organization of this work and the preparation of talks for these group meetings so that this work may be better standardized.

During the early spring Mr. Strong and Mr. Wolfe sent to all the former employees on our eradication work a summary of the previous season's work.

F. Educational Work in Individual States.

This work has been handled directly by the state leaders in each state. A report of the work done by these men will be found in connection with the individual state reports. An effort is made by the leader of the educational project to work in close cooperation with each state leader giving suggestions and supplying materials. Due to the interference of quarantine work not enough time has been available to be as helpful to the state leaders as should be possible in this work.

Specimens prepared in the usual way, pictures and lantern slides have been provided as fast as they were available. During the next season an effort should be made to develop a blister rust picture album for the use of the state leaders. The preparation of one for California has been started in cooperation with Mr. Boos.

Besides supplying the state leaders with small lots of mounted specimens and literature, a set of the best pictures available of our western work at the time was submitted to each for selection of pictures for lantern slides. A set of from 24 to 36 pictures was made by each state leader. The negatives were sent to Washington, the slides prepared and colored so that this year for the first time slides of our western work are in the possession of each of our state leaders.

G. Recommendations

1. That the regular news letter to be continued.

2. That the Summer News Letter be further developed and the

final summarizing issue be distributed to all past employees as well as to our general mailing list.

3. That the different projects be summarized for the period of their existence and issued to our general mailing list.

4. That an assistant be provided in the educational work each winter, his time to be given largely to summarizing data and preparing specimens. His help would not be needed during the field season consequently he could be employed on some field project.

5. That the following work to be done during 1928:

A. Prepare an article on black currant eradication for Farm Trio. The Trio consists of "The Oregon Farmer" "The Washington Farmer", and "The Idaho Farmer".

B. Prepare an article on quarantine for the Farm Trio.

C. Mimeograph compilations to be prepared for distribution.

1. Summary of black currant eradication in Oregon, Washington and Idaho.

2. Summary of eradication work to date.

3. History and spread of white pine blister rust in the West.

D. Developing sets of lantern slides.

1. A very simple elementary set should be developed to show the nature of fungus disease and the details of the white pine blister rust.

2. A set showing the white pine from the gathering of the seed to its final ultimate uses in the home. The same should be prepared for sugar pine.

3. A set on the wild currants and gooseberries of the West, their habit of growth, characteristics, fruit, flower and ecology.

4. A set showing the life of an eradicator in the eradication camp—the work and the method of living, play and entertainment.

E. Picture albums be prepared, in cooperation with the state leader, for each state.

F. That summaries of the different phases of our work be prepared for the eastern news letter.

G. That all of the fairs in fall 1928 in northern Idaho be provided with an educational demonstration on blister rust.

H. The small demonstration boxes be completed and distributed to project leaders, state inspectors, C. C. agents and forest supervisors in white pine territory.

I. More infected white pine specimens for tubes as well as large specimens should be collected.

6. That a small dark room be made available.

6. That a small dark room be made available.

Expenditures

Western Office of Blister Rust Control
January 1, 1927 to June 30, 1927.

Projects	Salaries	Expenses	Total	Subsistence and Expenses	R.R., Pullman, Steamship	Autos, Pers.Exp.	Autos Rental	Autos Operation	Autos, (Gov't.) Operation	Freight, Express, Drayage	Supplies and Equipment	Miscellaneous
1.1 - Cultivated black currant location and eradication in cooperation with states												
1.11 Montana	$ 275.00	$ 189.78	$ 464.78	$ 37.55	$ 97.23							
1.12 Idaho	606.66	699.20	1,307.86	542.00				$ 149.55			$ 1.00	$ .95
1.13 Washington	713.32	181.52	894.84			$ 120.64				$ 2.70	9.60	
1.14 California	1,962.50	1,098.17	3,060.67	452.16	182.15	406.19				8.30	50.17	3.22
1.2 - Inspection of transported host plants in cooperation with the Federal Horticultural Board	3,600.17	1,762.78	5,362.95	1,562.41	181.91					10.66	.50	7.64
1.3 - Sanitation of Nurseries												
1.34 Oregon	1,771.76	1,291.76	3,063.52	556.94	47.64	247.67				63.46	51.26	22.19
2.2 - Testing and improving physical destruction of Ribes												
2.22 Idaho	26.60	352.41	642.05								36.01	16.64
2.23 Oregon		11.50	11.50								15.44	
2.24 California	62.66	71.91	153.69								66.48	5.60
2.3 - Testing and improving chemical destruction of Ribes	1,579.01	846.77	2,426.76	160.97	6.27		41.45	21.92		65.19	199.45	4.05
2.4 - Ecological studies	2,429.82	1,173.41	3,496.23	542.15	259.92	167.73				65.26	134.74	1.66
3.1 - Control Reconnaissance on Federal lands												
3.11 Montana	570.20	451.89	1,021.09	171.25	105.72	74.93				4.00	95.09	.45
3.12 Idaho	1,37.55	682.44	2,061.97	522.47	59.91	23.46				15.66	347.74	22.04
3.13 Washington	224.00	172.97	396.97	102.61	6.26	22.91				6.70	50.47	4.26
3.14 California	1,491.00	726.95	2,167.95	522.65	11.60	27.09	104.43	29.95		50.10	110.66	5.60
3.2 - Ribes eradication on Federal lands												
3.22 Idaho	6,716.66	4,562.10	11,279.76	1,596.49	4.62	35.09			60.49	252.91	2,194.82	301.05
3.24 California	2,909.96	1,475.36	4,385.32	829.61	33.91	106.27				64.66	276.29	76.42
3.3 - Control demonstration on private lands	3,087.82	1,699.85	4,787.67	696.65	197.09	112.42	126.00	32.80		44.47	574.61	22.12
4.1 - Spread of the rust												
4.11 Idaho		12.00	12.00								12.00	
4.13 Washington		21.67	21.67								21.67	
4.16 British Columbia											5.04	.61
4.2 - Burn to fire	725.00	296.47	1,021.47	112.32	120.24	44.6						
6. Educational work												
6.1 General education	1,066.67	374.34	1,441.11	94.80	14.24					2.50	61.12	74.74
6.11 Montana	225.00		225.00									
6.13 Washington	150.00		150.00									
6.14 Oregon	466.67	352.31	819.9	104.65	34.52	202.00				.96		6.96
6.15 California		1.03	1.03							1.54		.10
9.1 - Supervision	1,900.01	591.91	2,491.91	12.29	471.22							1,066.52
9.2 - Maintenance of Field Office	4,612.84	1,066.82	5,679.66									2,22.66
9. - Miscellaneous Supplies		1,292.57	1,292.57						*46.21			
Totals	$ 39,307.99	$ 21,407.23	$ 60,811.16	$ 8,[illegible]	$ 2,674.16	$ 1,[illegible]	$ 271.13	$ 461.62	$ 62.[illegible]	$ 752.97	$ 4,[illegible]	$ [illegible]

*State car - no rental charge

1927 Annual Report
Roy Calhoun

Expenditures

Western Office of Blister Rust Control
July 1, 1927 to December 31, 1927.

Projects	Salaries	Expenses	Total	Subsistence and Expenses	R.R., Pullman Stage, etc.	Autos, Personal	Autos Rental	Autos Operation	Autos (Gov't.) Operation	Freight, Express, Drayage	Supplies and Equipment	Miscellaneous
1.1 - Cultivated black currant location and eradication in cooperation with states												
1.11 Montana	150.00		150.00									
1.12 Idaho	1,571.34	1,925.27	3,496.61	1,437.74				$ 478.42			.20	8.55
1.13 Washington	1,321.67	1,834.30	3,155.97	1,028.50	40.67	752.08				.98	14.27	.90
1.15 California	2,150.66	3,521.26	5,711.92	1,436.93	43.82	2,030.07				1.04	5.00	4.40
1.2 - Inspection of transported host plants in cooperation with the Federal Horticultural Board	3,277.92	1,759.35	5,037.27	1,261.79	141.62	278.46		P 20.66	19.20	.65	36.45	
1.34- Sanitation of Nurseries	1,601.83	1,830.98	3,432.81	836.30	39.79	913.85				.97	33.37	7.70
2.3 - Testing and improving chemical destruction of Ribes	3,354.17	3,201.36	6,555.53	1,021.68	466.76		2.50		87.43	66.61	1,433.82	122.66
2.4 - Geological Studies	5,420.87	3,225.05	8,645.92	1,637.11	369.17	696.66	47.50		4.69	36.20	413.51	30.91
3.1 - Control Reconnaissance on Federal lands												
3.11 Montana	1,647.42	539.60	2,187.02	220.71	29.23	212.03					77.43	.20
3.12 Idaho	3,804.31	2,266.40	6,070.71	1,272.53	136.77	13.76			53.54	1.00	745.76	12.62
3.13 Washington	1,075.00	858.65	1,933.65	620.09	12.61	116.44	17.00				78.61	11.90
3.15 California	1,863.34	1,351.69	3,215.03	417.19	48.27	45.52	27.72	3.00	64.00	83.16	839.90	18.94
3.2 - Ribes eradication on Federal lands												
3.22 Idaho	24,219.51	9,019.13	34,238.64	6,605.52	84.33				226.33	674.66	1,460.27	9.02
3.24 Oregon	3,185.01	1,889.93	5,074.64	816.79	146.24	673.62				116.64	128.56	7.66
3.25 California	4,169.50	1,686.71	5,856.21	1,094.66	60.08	218.40	14.00			66.76	206.13	17.67
3.32- Control demonstration on private lands	4,500.01	2,842.94	7,342.95	1,347.64	63.73	272.37	4.00		15.91	200.14	690.53	39.06
4.1 - Spread of the rust												
4.11 Montana	366.66	340.38	707.04	178.15		170.73					1.80	
4.12 Idaho	719.66	795.60	1,422.26	343.76	46.88	271.46						1.80
4.13 Washington	2,907.83	3,212.61	6,120.44	1,574.17	149.26	1,333.10				42.68	198.18	9.90
4.14 Oregon	739.60	992.28	1,730.78	560.66	30.16	326.32			15.22		26.40	11.00
4.15 California	286.33	108.93	394.26	81.19	34.16	18.74					.90	1.80
4.16 British Columbia	157.09	292.95	450.04	146.04	67.44	78.17				6.96		.23
6. - Educational work												
6.0 General education	1,050.00	1,064.17	2,114.17	44.16	21.64					6.62	609.56	442.24
6.1 Montana	251.67	36.39	288.06	6.25		28.14						
6.4 Oregon		53.70	53.70								27.00	26.70
6.5 California	264.50	25.37	289.87	14.95	4.06					1.34	4.62	.16
7.1 - Supervision	2,000.00	224.73	2,224.73	51.83	183.76							.16
7.2 - Maintenance of field office	5,258.99	1,632.12	6,891.11	14.26	121.33							1,495.64
7.3 - Miscellaneous supplies		758.32	758.32							70.62	300.68	387.02
9.4 - Supplies and freight paid in Washington		2,476.14	2,476.14							274.60	2,201.54	
Total	78,866.09	49,691.01	$128,557.10	$24,190.11	$2,321.85	$6,446.64	$113.02	$ 479.42 ** 20.66 3.00	$520.76	$1,644.93	$9,320.74	$2,647.38

*State car - no rental charge
**Operation D. R. Paine's personal car

816

GENERAL SUMMARY

I. Delaying the Spread of Blister Rust.

A. Distribution of the Disease.

During the past year scouting was carried on in western and northeastern Washington and northern Idaho.

Scouting in western Washington shows two well-established centers of pine infection: (1) Kitsap County, and (2) Kendall-Maple Falls area in Whatcom County. Infection on Ribes was generally prevalent in counties of Washington west of the Cascades with a decreased amount from the north towards the southwest. The southernmost pine infection was found at Spirit Lake on the Toutle River in Skamania County, T. 9 N., R. 5 E., Section 18.

Ribes infection was found in northeastern Washington in Ferry, Okanogan and Stevens counties. The one Ribes infection in Idaho was found 7½ miles north of Priest River, Idaho. This is in T. 57 N., R. 5 W., Sec. 23.

B. Cultivated Black Currant Eradication.

The eradication of R. nigrum has been completed in Montana, Idaho, Washington and Oregon. In California it has been eradicated from about two-thirds of the state. A total of 10,277 plantings comprising 141,087 plants has been destroyed in this work.

C. Maintenance of Blister Rust Quarantine.

The quarantines regulating the movement of blister rust host plants have been effectively maintained. Inspection of 61,804 shipments of nursery stock to prevent unlawful movement of blister rust host plants resulted in the finding of 40 violations of Quarantine 63 in freight, express, and parcel post shipments and 142 violations by automobiles.

II. Experimental Development and Demonstration of Local Control Measures.

A. Eradication of Ribes.

Experimental work in developing local control measures and demonstrating the practicability of their application has been carried forward on the National Forests of Idaho and California, to evolve practical and inexpensive methods of eradicating Ribes under western forest conditions. In this work 16,473.5 acres on the Coeur d'Alene National Forest in Idaho were eradicated of 2,068,533 Ribes at an average

GENERAL SUMMARY

I. Delaying the Spread of Blister Rust.

A. Distribution of the Disease.

During the past year scouting was carried on in western and northeastern Washington and northern Idaho.

Scouting in western Washington shows two well-established centers of pine infection: (1) Kittsap County, and (2) Kendall-Maple Falls area in Whatcom County. Infection on Ribes was generally prevalent in counties of Washington west of the Cascades with a decreased amount from the north towards the southwest. The southernmost pine infection was found at Spirit Lake on the Toutle River in Skamania County, T. 9 N., R. 5 E., Section 18.

Ribes infection was found in northeastern Washington in Ferry, Okanogan and Stevens counties. The one Ribes infection in Idaho was found 7½ miles north of Priest River, Idaho. This is in T. 57 N., R. 5 W., Sec. 23.

B. Cultivated Black Currant Eradication.

The eradication of R. nigrum has been completed in Montana, Idaho, Washington and Oregon. In California it has been eradicated from about two-thirds of the state. A total of 10,277 plantings comprising 141,087 plants has been destroyed in this work.

C. Maintenance of Blister Rust Quarantine.

The quarantines regulating the movement of blister rust host plants have been effectively maintained. Inspection of 61,804 shipments of nursery stock to prevent unlawful movement of blister rust host plants resulted in the finding of 40 violations of Quarantine 63 in freight, express, and parcel post shipments and 142 violations by automobiles.

II. Experimental Development and Demonstration of Local Control Measur

A. Eradication of Ribes.

Experimental work in developing local control measures and demonstrating the practicability of their application has been carried forward on the National Forests of Idaho and California, to evolve practical and inexpensive methods of eradicating Ribes under western forest conditions. In this work 16,473.5 acres on the Coeur d'Alene National Forest in Idaho were eradicated of 2,088,838 Ribes at an aver

per acre cost of $2.40. On the Stanislaus National Forest in California 3,536.4 acres were eradicated of 211,040 Ribes at an average per acre cost of $2.00. The results indicate that local control measures can be developed and applied at costs which will make practical their general application on western white and sugar pine forests.

B. Chemical Eradication of Ribes.

Certain species of Ribes (R. petiolare and G. inermis) grow in dense local concentrations in western white pine forests and are difficult and expensive to eradicate by hand. Experiments were continued to find an inexpensive chemical that will kill these plants and to develop practical methods for its application. So far the best results were obtained from the use of a sodium chlorate spray which killed 96.3% of the treated R. petiolare. It was not so effective against G. inermis. The experiments are incomplete, but appear to indicate: that, absorption takes place since the roots and crowns have been killed after spraying the aerial portions; that, different species of Ribes show a range of susceptibility to different chemicals and even to different concentrations of the same chemical; that, Ribes of moist habitat are the most susceptible; that the best results are obtained by applying the chemicals early in the growing season; that, a period of warm, dry weather with a slight fall of dew in the evening and early morning seems to provide ideal conditions for the action of the chemical; and that, full sunlight accelerates the action of the chlorates.

Suitable power apparatus for applying sodium chlorate spray rapidly and inexpensively under western forest conditions is being developed and tested. Experiments were conducted to determine the best methods of crew management in chemical eradication. A much larger area was sprayed at Bovill, Idaho, this year than ever before.

C. Control Reconnaissance.

This work supplements the experimental development of local control measures. It consists of a preliminary survey of western white and sugar pine forests to obtain information on blister rust hosts and general topographical and forestry conditions, as a basis for developing plans for the general application of local control measures and estimating the cost of the work. During the past year a control reconnaissance was made of 1,099,870 acres on National Forests in Idaho, Montana and California and of 612,635 acres on private forests in Idaho, the latter being done in cooperation with the forest owners. Including the work done prior to 1927, a total of 1,968,012 acres has been reconnaissanced on National Forests and 880,994 acres on private forests of the western white and sugar pine regions.

D. Ribes Ecological Studies.

per acre cost of $2.40. On the Stanislaus National Forest in California 3,536.4 acres were eradicated of 311,040 Ribes at an average per acre cost of $2.00. The results indicate that local control measures can be developed and applied at costs which will make practicable their general application on western white and sugar pine forests.

B. Chemical Eradication of Ribes.

Certain species of Ribes (R. petiolare and G. inermis) grow in dense local concentrations in western white pine forests and are difficult and expensive to eradicate by hand. Experiments were continued to find an inexpensive chemical that will kill these plants and to develop practical methods for its application. So far the best results were obtained from the use of a sodium chlorate spray which killed 96.3 of the treated R. petiolare. It was not so effective against G. inermis. The experiments are incomplete, but appear to indicate: that, absorption takes place since the roots and crowns have been killed after spraying the aerial portions; that, different species of Ribes show a range of susceptibility to different chemicals and even to different concentrations of the same chemical; that, Ribes of moist habitat are the most susceptible; that the best results are obtained by applying the chemical early in the growing season; that, a period of warm, dry weather with a slight fall of dew in the evening and early morning seems to provide ideal conditions for the action of the chemical; and that, full sunlight accelerates the action of the chlorates.

Suitable power apparatus for applying sodium chlorate spray rapidly and inexpensively under western forest conditions is being developed and tested. Experiments were conducted to determine the best methods of crew management in chemical eradication. A much larger area was sprayed at Bovill, Idaho, this year than ever before.

C. Control Surveys.

This work supplements the experimental development of local control measures. It consists of a preliminary survey of western white and sugar pine forests to obtain information on blister rust hosts and general topographical and forestry conditions, as a basis for developing plans for the general application of local control measures and estimating the cost of the work. During the past year a control reconnaissance was made of 1,099,870 acres on National Forests in Idaho, Montana and California and of 812,835 acres on private forests in Idaho, the latter being done in cooperation with the forest owners. Including the work done prior to 1927, a total of 1,966,012 acres has been reconnoitered on National Forests and 880,994 acres on private forests of the western white and sugar pine regions.

D. Ribes Botanical Studies.

The different species of Ribes that must be eradicated to protect the western white and sugar pine forests from blister rust are being studied. Ecological work during the past year was composed of the following studies:

1. Controlled plot study of Ribes.

2. Results of duff disturbance.

3. Restocking of Ribes after eradication.

4. Root competition studies.

5. Life habits of Ribes.

6. Seed germination tests.

7. Leaf-area, live-stem studies.

Results to date point to the following conclusions, to be further verified by future work:

1. Laboratory germination tests of seeds of R. viscosissimum required a minimum of 8 months dormancy before germination.

2. Ribes germinated in laboratory only in April.

3. Ribes germinated in field in May to October inclusive.

4. Ribes seeds are mostly stored in the extreme basal portion of the duff mantle of the forest floor.

5. Most Ribes start fruiting in the third year, reaching a fruiting peak at from 5 to 10 years.

6. Any duff disturbance such as fire, skid trails, upturns and hand pulling, may result in Ribes germination.

7. Removal of slash without disturbing duff does not result in germination.

8. Survival of Ribes seedlings under heavy shade is relatively low; in the open it is (1) very high if on a moist site and (2) lower if on a dry site.

Work was continued on the plot previously established at

The different species of Ribes that must be eradicated to protect the western white and sugar pine forests from blister rust are being studied. Ecological work during the past year was composed of the following studies:

1. Controlled plot study of Ribes.

2. Results of duff disturbance.

3. Reestocking of Ribes after eradication.

4. Root competition studies.

5. Life habits of Ribes.

6. Seed germination tests.

7. Leaf-area, live-stem studies.

Results to date point to the following conclusions, to be further verified by future work:

1. Laboratory germination tests of seeds of R. vissosissimum required a minimum of 3 months dormancy before germination.

2. Ribes germinated in laboratory only in April.

3. Ribes germinated in field in May to October inclusive.

4. Ribes seeds are mostly stored in the extreme basal portion of the duff mantle of the forest floor.

5. Most Ribes start fruiting in the third year, reaching a fruiting peak at from 5 to 10 years.

6. Any duff disturbance such as fire, skid trails, cultural and bed pulling, may result in Ribes germination.

7. Removal of plant without disturbing duff does not result in germination.

8. Survival of Ribes seedlings under heavy shade is relatively low; in the open it is (1) very high on a moist site and (2) lower if on a dry site.

Work was continued on the plot previously established at

5. Ribes Control Studies.

Cheekye, B. C. where studies are being made on eradicated and uneradicated areas before and after fire. Infection on planted pines is also being studied on this plot.

E. Educational Work.

In order to disseminate information regarding the blister rust control program, the following measures were employed: Western Blister Rust News Letter; a summer news letter for temporary employees; talks and papers; demonstration boxes, fair exhibits, etc. The securing of satisfactory pictures of the work has received considerable attention during the past year.

F. Investigation of C. ribicola.

Research on the fungus has been carried on by the Office of Forestry Pathology.

Chestye, E. C. where studies are being made on eradicated and marginal cutal areas before and after fire. Infection on planted plots is also being studied on this plot.

6. Financial work.

In order to disseminate information regarding the blister rust control program, the following measures were employed: Western Blister Rust News Letter; summer news letter for temporary employees talks and papers; demonstration-boxes, fair exhibits, etc. The securit of satisfactory pictures of the work has received considerable attentic during the past year.

7. Investigations of C. ribicola.

Research on the fungus has been carried on by the Office of Forestry Pathology.